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STEAM ENGINE.

Continued.

I PROCEED now to give an account of the improvements, or supposed improvements, that have been suggested subsequent to the patent of Mr. Watt, of Birmingham.

In so doing, I shall confine myself to the statement of facts. Whatever my own opinion may be, I feel the absence of twenty years practical knowledge, too strongly, to conceive my opinions entitled to any weight: if it were otherwise, the fairest and most satisfactory course for me to pursue, is to give information from which others may make up their minds on any preference which different plans may be entitled. I shall present, as faithfully as I can, all the useful knowledge on this subject, that the compass of this publication will enable me to furnish. My own actual experience, extends no farther than an eight hour engine of Watt's construction, which for about two years was under my own management. Whatever else I may know, I derive from the same sources I present to my reader.

I make these observations, in reply to some letters on the subject, which require to be thus noticed.

The plan of this work will not permit me to insert plates of *all* the steam engines subsequent to Watt's. I wish it would. The subject is of great importance. James Watt, of Birmingham, would have been cheaply purchased by England at the price of *twenty millions sterling*. I foresee the time when *civil engineers* will be rising up among us. To such persons this paper will be of use. But though I cannot insert *every thing* I wish to see on the subject of steam engines, I shall insert every thing that appears to me of chief importance in the way of improvement, so that this essay shall not leave any *principle* unknown. In the present essay, and in the references I am now about to give, *every thing* material to be known respecting steam engines, either in theory or in practice, so far as it is contained in English or French publications, may be found. I much wish the whole was published together in a separate volume.

Architecture hydraulique par M. Prony, 2 vols. qto.

Repertory of Arts, old series.

Hornblower's engine with pl. IV. 361. IX. 290. and N. S. VII. 81.
Cartwright's X. and XIV. 362. and 1 Phil. Mag. 1.
Robertson's XVI. 364.

New series.

Boaz's engine with plate VIII. 321.
Trevethick's IV. 241.
Rider's VII. 258.
Murdoch's XIII. 11.
Woolf's VI. 4. VIII. 86.
Deverill's VIII. 81.
On the force of Steam I. 22.

T. C.

Specification of the patent granted to Mr. Jonathan Hornblower, *of Penryn, in the county of Cornwall, plumber and brasier; for his invention of a machine or engine for raising water, or other liquids, and for other purposes, by means of fire and steam.*

Dated July 13, 1781.—Term expired, 1795.

TO all to whom these presents shall come, &c. Now KNOW YE, that, in compliance with the said proviso, and in pursuance of the said statute, I, the said Jonathan Hornblower, do hereby declare, that my said invention is described in manner and form following: that is to say, first, I use two vessels in which the steam is to act, and which, in other steam engines, are generally called cylinders. Secondly, I employ the steam, after it has acted in the first vessel, to operate a second time in the other, by permitting it to expand itself, which I do by connecting the vessels together, and forming proper channels and apertures, whereby the steam shall occasionally go in and out of the said vessels. Thirdly, I condense the steam, by causing it to pass in contact with metalline surfaces, while water is applied to the opposite side. Fourthly, to discharge the engine of the water used to condense the steam, I suspend a column of water in a tube or vessel constructed for that purpose on the principles of the barometer; the upper end having open communication with the steam-vessels, and the lower end being immersed into a vessel of water. Fifthly, to discharge the air which enters the steam vessels with the condensing water, or otherwise, I introduce it into a separate vessel, whence it is protruded by the admission of steam. Sixthly, that the condensed vapour shall not remain in the steam vessel, in which the steam is condensed, I collect it into another vessel, which has open communication with the steam vessels, and the water in the mine, reservoir, or river. Lastly, in cases where the atmosphere is to be

employed to act on the piston, I use a piston so constructed as to admit steam round its periphery, and in contact with the sides of the steam vessel, thereby to prevent the external air from passing in between the piston and the sides of the steam vessel. In witness whereof, &c.*

I give no account of Mr. Trevethick's engine, where the depressing force on the piston is a column of water, because this does not come under the description of a steam engine. An account of this engine may be found in 1 Nich. Jour. 8vo. Series 161. But it appears that Mr. Trevethick erected steam engines that worked without condensing the steam. The following account is sufficient to render them unpopular, though perhaps unjustly.

Dreadful accident. On Thursday the 8th of Steptember, a steam engine employed to assist in clearing the works from water at the tide-mills now erecting in the marsh between Greenwich and Woolwich, was blown up by the force of the contained steam. The explosion was as sudden and dreadful as that of a powder-mill, and was accompanied with a similar noise, which was heard at a great distance from the place. The engine was on Mr. Trevethick's plan, worked by the expansive force of steam only, without employing condensation as in the engines in common use. It was literally blown to pieces; and we are sorry to state, that by the accident three people were killed on the spot, and three others, all that were there at the time, so much hurt that two of them are not expected to recover. It was a fortunate circumstance that the accident happened at a time when the other workmen were at dinner, or a much greater number might have lost their lives.

* This patent seems to me to forestall, in some degree, the improvement of Mr. Woolf, in working his steam twice over. I am unable to say, whether this patent has been in much demand.

T. C.

Steam engines on Mr. Trevethick's plan require a boiler of immense strength; for they work with a power sometimes equal to 60 pounds on the square inch, while common engines, even Mr. Watt's, seldom work with more than 5 pounds. We are happy to state, however, that the present accident arose, not from the impossibility of making a boiler strong enough, but from a culpable mismanagement of a boy appointed to attend the engine. Impatient to finish his work, he had put a piece of timber between the top of the safety valve and a beam above it, so that it could not rise to allow steam to escape when produced in greater quantity than required. He even went away to fish in the river. In the mean time the engine was stopped by another workman, who knew not what the boy had done, and in a short time the mischief we have stated followed. The boy had returned, and was in the very act of removing the piece of wood he had so imprudently put over the valve when the explosion took place. He was the least hurt of all who were near the spot.

This accident ought to serve as a warning to engineers, to construct their safety valves in such a manner that common workmen cannot stop them at their pleasure; which may be easily done.

From the way in which part of the boiler was bent, which was constructed of cast iron nearly an inch in thickness, it is thought the steam must have acquired an expansive force equal to 500 pounds on the square inch before it gave way—a force much beyond any that can be required. But though this shows that engines on Mr. Trevethick's plan, may, with proper precautions, be worked with as much safety as those on the common principle, such an accident as the one we have stated cannot fail to intimidate some people from adopting them. It is therefore with much pleasure we state that a boiler on a new construction, calculated to bear a much higher de-

gree of expansive force than can ever in any case be required, has been lately invented by a very able engineer, Mr. Woolf. It consists of a combination of cylindrical tubes, which unite the double advantage of exposing a much larger surface to the action of the fire than the common boiler, while they possess a much greater degree of strength. This invention appears to us so important, that we shall take an early opportunity of laying a description of it before the public.

The latest and most important improvements are contained in Mr. Woolf's patent for his steam engine.

A short Account of Mr. Arthur Woolf's *improvement in the Construction of Steam Engines.*

Mr. Woolf founds his improvements on a very important discovery which he has made respecting the expansibility of steam when increased in temperature beyond the boiling point, or 212° of Fahrenheit's thermometer. It has been known for some time, and for this discovery the world is indebted to Mr. Watt, who has been the principal improver of the steam engine, that steam acting with the expansive force of four pounds the square inch against a safety-valve exposed to the atmosphere, is capable of expanding itself to four times the volume it then occupies, and still to be equal to the pressure of the atmosphere. Mr. Woolf has discovered that, in like manner, steam of the force of five pounds the square inch can expand itself to five times its volume; that masses or quantities of steam of the like expansive force of six, seven, eight, nine, or ten pounds the square inch, can expand to six, seven, eight, nine, or ten times their volume, and still be respectively equal to the atmosphere, or capable of producing a sufficient action against the piston of a steam engine to cause the same to rise in the old engine (with a counterpoise) of Newcomen, or to be carried into the vacuous

part of the cylinder in the improved engines first brought into effect by Messrs. Boulton and Watt; that this ratio is progressive, and nearly if not entirely uniform, so that steam of the expansive force of 20, 30, 40, or 50 pounds the square inch of a common safety-valve will expand itself to 20, 30, 40, or 50 times its volume; and that, generally, as to all the intermediate or higher degrees of elastic force, the number of times which steam of any temperature and force can expand itself, is nearly the same as the number of pounds it is able to sustain on a square inch exposed to the common atmospheric pressure: provided always that the space, place, or vessel in which it is allowed to expand itself, be of the same temperature as that of the steam before it be allowed room to expand.

Respecting the different degrees of temperature required to bring steam to, and maintain it at, different expansive forces above the weight of the atmosphere, Mr. Woolf has found, by actual experiment, setting out from the boiling point of water, or 212°, at which degree steam of water is only equal to the pressure of the atmosphere, that in order to give it an increased elastic force equal to five pounds the square inch, the temperature must be raised to about $227\frac{1}{2}°$, when it will have acquired a power to expand itself to five times its volume, still be equal to the atmosphere, and capable of being applied as such in the working of steam engines, according to his invention: and with regard to various other pressures, temperatures, and expansive forces of steam, the same are shown in the table which he has inserted in the following specification:

Specification of the Patent granted to Arthur Woolf, *of Spa Fields, in the County of Middlesex, for certain Improvements in the Construction of Steam-Engines. Dated June* 7, 1804.

To all to whom these presents shall come, &c. Now know ye, that in compliance with the said proviso, I the

said Arthur Woolf, do hereby describe and ascertain the nature of my said invention, and the manner in which the same is to be performed, as follows: that is to say, I have ascertained, by actual experiments, and have applied the same to practice, that as in practice it is found that steam acting with the expansive force of four pounds the square inch, against a safety-valve exposed to the atmosphere, is capable of expanding itself to four times the volume it then occupies, and still to be equal to the pressure of the atmosphere; so in like manner steam of the force of five pounds the square inch can expand itself to five times its volume. Masses or quantities of steam of the like expansive force of six, seven, eight, nine, or ten pounds the square inch, can expand itself to six, seven, eight, nine, or ten times its volume, and still be respectively equal to the atmosphere, or capable of producing sufficient action against the piston of a steam-engine, to cause the same to rise in the old engine (with a counterpoise) of Newcomen, or to be carried into the vacuous part of the cylinder in the improved engines first brought into effect by Boulton and Watt: and this ratio is progressive, and nearly, if not entirely, uniform; so that steam of the expansive force of twenty, thirty, forty, or fifty pounds the square inch of a common safety-valve, will expand itself to twenty, thirty, forty, or fifty times its volume; and, generally, as to all the intermediate or higher degrees of elastic force, the number of times which steam of any temperature and force can expand itself, is nearly the same as the number of pounds it is able to sustain on a square inch, exposed to the common atmospheric pressure; provided always, that the space, place or vessel, in which it is allowed to expand itself, be at least of as high a temperature, or nearly as high a temperature, as that of the steam before it be allowed room to expand: that is, whatever be the degree of heat necessary to the permanency of steam of the force

of twenty pounds the square inch, if steam of that force be employed, the space, place, or vessel in which it is allowed or intended to expand itself, should be of the same temperature, or nearly so; and so with steam of any other power, as of thirty, forty, or fifty pounds the square inch, the space, place, or vessel in which it is to expand, should be at or about the same degree of heat as steam of the force employed requires for its existence; in which case, as I have before stated, steam can expand itself about as many times as the number of pounds it could have sustained on a square inch as aforesaid, before it is allowed to expand or dilate itself. Here, however, it may be necessary to remark, that in stating this ratio, I only speak of the expansion of steam as it can be managed and commanded in practice, and not of the absolute expansion which perhaps might be obtained, if mechanism could be made so perfect as to prevent all escape of steam, and all partial condensation of it and waste of heat; for the real expansive force of steam, I am inclined to believe, from the experiments I have made, increases in a regular ratio a little beyond what I have stated, though I would not recommend that it should be calculated higher in applying it to steam-engines, because the difficulty of confining and managing it increases also as the elasticity of the steam is increased, or as its temperature is increased.

And here it may be of use to the public to state some facts respecting different degrees of temperature required to bring steam to, and maintain it at, different expansive forces above the weight of the atmosphere; because the temperature of the steam indicated by a thermometer, having its bulb in the boiler which produces it, will indicate the expansive force of the steam, without the trouble and inconvenience of changing the weights on the valve, by which its force is regulated for the work intended to be performed by it, and which valve acts as a common

safety-valve, so that those who attend the boiler will know with sufficient precision, by looking at the thermometer, how they ought to feed the fire; and, moreover, the relation between the temperature and the expansive force being known, the danger of accidents from the safety-valve becoming deranged will be lessened, for the workman will naturally be led to notice whether the safety-valve acts freely when the thermometer has risen to the degree that answers to the weight with which the valve is loaded for working. I have found by actual experiment, setting out from the boiling point, or two hundred and twelve degrees of the thermometer, commonly employed in this country, which is that of Fahrenheit, at which degree steam of water is only equal to the pressure of the atmosphere, that in order to give it an increased elastic force equal to five pounds the square inch, the temperature must be raised fifteen or sixteen degrees, or to about two hundred and twenty-seven and a half, when the steam will have acquired a power to expand itself to five times its volume, and still be equal to the atmosphere, and capable of being applied as such in the working of steam engines according to my said invention. And with regard to various other pressures, temperatures, and expansive forces of steam, the same are shown in the following table:

Table of the relative pressures per square inch, temperatures and expansibility of steam at degrees of heat above the boiling point of water, beginning with the temperature of steam of an elastic force equal to five pounds per square inch, and extending to steam able to sustain forty pounds on the square inch.

Pounds per square Inch.		Degrees of Heat.		Expansibility.	
Steam of an elastic force predominating over the pressure of the atmosphere upon a safety valve,	requires to be maintained by a temperature equal to about	and at these respective degrees of heat, steam can expand itself to about			times its volume, and continue equal in elasticity to the pressure of the atmosphere.
5		227½		5	
6		230¼		6	
7		232¾		7	
8		235¼		8	
9		237½		9	
10		239½		10	
15		250½		15	
20		259½		20	
25		267		25	
30		273		30	
35		278		35	
40		282		40	

And so in like manner, by small additions of temperature, an expansive power may be given to steam to enable it to expand to fifty, sixty, seventy, eighty, ninety, one hundred, two hundred, three hundred, or more times its volume, without any limitation but what is imposed by the frangible nature of every material of which boilers or other parts of steam engines have been or can be made; and prudence dictates that the expansive force should never be carried to the utmost the materials can bear, but rather be kept considerably within that limit.

Having thus fully explained my discovery of the expansive power and force of steam, I shall proceed to describe my improvements grounded thereon; and in so doing, I shall find it necessary to mention the entire steam engine, and its parts, to which, as an invention well known, I neither can nor do assert any exclusive claim; but at the same time I must here observe, that, from the nature of my said discovery, and its application, there can

be no difficulty in distinguishing my said improvements from the improved engine, as to its other common and well known component parts.

1st. If the engine be constructed originally with the intention of adopting my said improvements, it ought to have two steam vessels of different dimensions, according to the temperature or the expansive force determined to be communicated to the steam made use of in working the engine; for the smaller steam vessel, or cylinder, must be a measure for the larger. For example, if steam of forty pounds the square inch is fixed on, then the smaller steam vessel should be at least one-fortieth part the contents of the larger one. Each steam vessel should be furnished with a piston, and the smaller cylinder should have a communication both at its top and bottom (top and bottom being here employed merely as relative terms, for the cylinders may be worked in a horizontal, or any other required position, as well as vertical.) The small cylinder, I say, should have a communication both at its top and bottom with the boiler which supplies the steam; which communications, by means of cocks or valves of any construction adapted to the use, are to be alternately opened and shut during the working of the engine. The top of the small cylinder should have a communication with the bottom of the larger cylinder, and the bottom of the smaller one with the top of the larger, with proper means to open and shut these alternately by cocks, valves, or any other well known contrivance. And both the top and bottom of the larger cylinder or steam vessel should, while the engine is at work, communicate alternately with a condensing vessel, into which a jet of water is admitted to hasten the condensation; or the condensing vessel may be cooled by any other means calculated to produce that effect. Things being thus arranged, when the engine is at work, steam of high temperature is admitted

from the boiler, to act by its elastic force on one side of the smaller piston, while the steam which had last moved it has a communication with the larger steam vessel or cylinder, where it follows the larger piston, now moving towards that end of its cylinder which is open to the condensing vessel. Let both pistons end their stroke at one time, and let us now suppose them both at the top of their respective cylinders, ready to descend; then the steam of forty pounds the square inch entering above the smaller piston will carry it downwards, while the steam below it, instead of being allowed to escape into the atmosphere, or applied to any other purpose, will pass into the larger cylinder above its piston, which will take its downward stroke at the same time that the piston of the smaller cylinder is doing the same thing; and while this goes on, the steam which last filled the larger cylinder in the upward stroke of the engine will be passed into the condenser, to be condensed during the downward stroke. When the pistons in the smaller and larger cylinder have thus been made to descend to the bottom of their respective cylinders, then the steam from the boiler is to be shut off from the top, and admitted to the bottom of the smaller cylinder, and the communication between the bottom of the smaller and the top of the larger cylinder is also to be cut off, and the communication to be opened between the top of the smaller and the bottom of the larger cylinder; the steam, which in the downward stroke of the engine filled the larger cylinder, being now open to the condenser, and the communication between the bottom of the larger cylinder and the condenser shut off; and so alternately admitting the steam to the different sides of the smaller piston, while the steam last admitted into the smaller cylinder passes alternately to the different sides of the larger piston in the larger cylinder, the top and bottom of which are made to communicate alternately with

the condenser. In an engine working with the improvements which have been just described, while the steam is admitted to one side of the piston in the smaller cylinder, the steam on the other side has room made for its admission into the larger cylinder on one side of its piston, by the condensation going on on the other side of the large piston which is open to the condenser; and that waste of steam which takes place in engines worked only by the expansive force of steam, from steam passing the piston, is prevented; for all steam that passes the piston in the smaller cylinder is received into the larger. In such an engine, where it may be more convenient for any particular purpose, the arrangement may be altered, and the top of the smaller made to communicate with the top of the larger, and the bottom of the smaller with the bottom of the larger cylinder; in which case the only difference will be, that when the piston in the smaller cylinder descends that in the larger will ascend, and while the latter descends the former will ascend; which for some particular purposes may be more convenient than the arrangement before described.

2dly. As the difficulty of giving a proper degree of strength to large cylinders, and the cases for the same, which are to be exposed to the action of strong steam, increases in proportion as their size is augmented; instead of employing, besides the smaller cylinder or steam measure, one cylinder only of large diameter in steam engines of great power, I sometimes prefer substituting for the latter cylinder two or more cylinders of smaller diameter, but of such dimensions that their capacity, and the area of the pistons worked in them, are equal to the area of the one piston, and the capacity of the one cylinder which otherwise would be necessary; and such substituted cylinders are made to communicate with each other, that they may at one and the same time receive and part with

the steam by which the engine is worked; and their respective piston rods are so connected with one another, or with other parts of the machinery, that the pistons may act together.

3dly. With regard to steam engines which are already constructed, I improve the same by adding thereto a small cylinder or measure for the steam admitted to the working cylinder; this improvement may be introduced with great advantage into the steam engines constructed according to Mr. Watt's improvements; which small cylinder may be either employed only as a measure of the steam, or a piston may be worked in it by the expansive force of the steam, before it be allowed to pass into the present working cylinder or steam vessel, which in that case must have no direct communication with the boiler, but must be supplied with steam through the medium of the small added cylinder or steam measure. To make this more intelligible, suppose the steam measure or small cylinder added to one of Mr. Watt's single engines, or to one of similar construction, and that the small added cylinder is furnished with a piston to work by the expansive force of the steam, while the larger cylinder works by condensation; then all that is necessary is, that the top of the smaller added cylinder be connected with the boiler, and furnished with a cock or valve to shut off the steam, and that the boiler be of sufficient strength: let a pipe pass from the top to the bottom of the smaller added cylinder, furnished with a cock or valve, by which a communication may be made between the two sides of the piston in the said cylinder; let a pipe also pass from the bottom of the smaller cylinder to the top of the larger; let the larger cylinder, as is now commonly the case in practice, have a pipe passing from its top to its bottom, by which a communication can be made between the two sides of the piston in the large cylinder; and let the large cylinder

communicate with a condensing vessel, with valves, cocks, or any other contrivance to open or shut the different communications when necessary. Things being thus arranged, suppose the engine at work, and the pistons in both cylinders at the top of their respective cylinders, and suppose the steam admitted to enter the small cylinder above the piston; while the steam is thus entering, let the communication between the bottom of the small cylinder and the top of the large one be open, while the bottom of the large one is open to the condenser; then both pistons will descend. When they have reached the bottom of their respective cylinders, the communications between the boiler and the small cylinder, between the small cylinder and large cylinder, and between the latter and the condenser, must all be shut off; and the communications must be opened between the two sides of the smaller piston and between the two sides of the larger piston: then, as the pistons ascend, the steam which was last admitted above the small piston will pass to its under side, while the steam which was last admitted to the top of the large from the lower part of the small cylinder will pass into the lower part of the large cylinder under its piston, and both pistons will at the same time ascend by the action of the counter-weight, or the momentum of the fly, as the case may be. When both pistons have reached the top of their respective cylinders, the last mentioned communications are shut, and the others are opened as before, and both will descend; the steam which was last admitted to the under side of the small piston passing into the upper end of the large cylinder, while the steam last introduced below the piston of the large cylinder goes off to the condenser. Or an arrangement similar to the following may be adopted: Let only the bottom part of the smaller cylinder have a communication with the boiler, and let there be also a communication between the bottom

of the smaller and the top of the larger cylinder, and another communication between the top part of both cylinders which last mentioned communication always remains open; and let the top and bottom of the large cylinder also communicate by means of a side pipe; and let the bottom part of the large cylinder communicate with a condenser. Things being thus arranged, when steam is admitting into the lower part of the smaller cylinder, the piston in that cylinder will ascend; the communication between the top of the two cylinders being then open, to allow the steam above the smaller piston to pass into the top of the larger, where it is not to be detained, but, along with the steam above the piston in the large cylinder, to be allowed to pass under the last mentioned piston (which is now ascending as well as the piston in the smaller cylinder), the communication between the two sides of the large piston being now open, and the communication with the condenser shut off. Both pistons having reached the top of their respective cylinders, the communications which before were open must now be shut (excepting the communication between the two cylinders at their upper part) and the communications between the bottom of the small and the top of the large, and between the bottom of the large and the condenser, must be opened: the steam last admitted into the lower part of the smaller cylinder will now ascend into the top of the larger and expand itself, following the piston of the larger cylinder which is now descending, its other side being open to the condenser; and (as the tops of the two cylinders communicate) steam will also pass into the top of the smaller cylinder above its piston, so that both pistons descend together to the bottom of their respective cylinders; when a fresh charge of steam is again to be admitted for a fresh stroke of the engine.

4thly. If my improvements be applied to one of the engines known by the name of Watt's double engine, the working cylinder must have no direct communication with the boiler, but must be made to communicate at its top and bottom alternately with the lower and upper part of the smaller added cylinder, or simply, as the case may be, at its top and bottom, with the steam measure, which has a direct communication with the boiler; the effect of which must be sufficiently obvious from the details I have already given respecting the nature of my invention, and the way in which the same is to be carried into actual practice.

5thly. With regard to steam engines, in which the separate steam measure may not be thought advisable, the same may be improved by the application of my aforesaid discovery, by making the boiler, and the steam case or cases in which the working cylinder or cylinders is or are inclosed, much stronger than usual; and by altering the structure and dimensions of the cocks, valves, slides, or other means of admitting steam from the boiler into the cylinder or cylinders, in such a manner as that the steam may be admitted very gradually by a progressive enlargement of the aperture, so as at first to wiredraw, and afterwards admit more freely the same. The reason for this precaution is this: Steam of such great elastic force as I employ, if admitted suddenly into the cylinder or cylinders, when more than one working cylinder is employed, would strike with a force that would endanger the safety and durability of the engine. The aperture allowed to the valve, cock, or other contrivance for admitting steam into the cylinder or cylinders, should be regulated by the following consideration:—If the intention is that the engine should work only, or almost wholly, by condensation, the steam in passing into the cylinder or cylinders should be forced to wiredraw itself, as I have already said, but so

that the piston or pistons may perform the whole or a great part of the stroke by the time the intended quantity of steam has been admitted into the cylinder or cylinders: for example, when steam of forty pounds the square inch is used, such a quantity of the same as shall be equal in volume to one-fortieth of the capacity of the cylinder or cylinders, and so in proportion when steam of any other force is employed; and when the requisite quantity has been admitted, the steam is to be shut off till the proper moment for admitting a fresh quantity. But if it is intended that advantage shall also be taken of the elastic force of the steam acting on one side of the piston or pistons, while condensation goes on on the other side, then the steam must be admitted more freely, but still with caution at the first, for the reason already mentioned. And in this, as well as in every other application of my said improvements, grounded on my said discovery of the law of expansibility of steam, due and effectual means must be used to keep up the requisite temperature of all the parts of the apparatus into which the steam is admitted, and in which it is not intended to be condensed. And here it may be proper to state, that, instead of the obvious and usual means for accomplishing this, namely, inclosing them in the boiler, or in a steam case or cases communicating with the boiler, the following method may sometimes be used with advantage, viz. a separate fire under the steam case or cases, which, in that event, will become a boiler or boilers, and must be furnished with a safety-valve or valves to regulate the temperature. By means of the last-mentioned arrangement, the steam from the smaller cylinder or steam measure (when either of these is employed) may be admitted into the larger cylinder or cylinders kept at a higher temperature than the smaller, by which its power to expand itself may be increased; and, on the contrary, by keeping the larger at a

lower temperature than the smaller, its expansibility will be lessened; which, on particular occasions, and for particular purposes, may be desirable. In every case care must be taken that the boiler, the case or cases in which the cylinder or cylinders is or are inclosed, the steam pipes, and generally all the parts exposed to the action of the expansive force of the steam, be of a strength proportioned to the high pressure to which they are to be exposed. With regard to the due degrees of strength of the parts of all my said improvements, together with the nature of the materials, and the proportions of the same, except as herein described, I forbear any further description, on account of the numerous variations to which the same must be subjected; and because every engineer, of sufficient skill to be employed in works of this nature, will, without difficulty, arrange and determine the same according to the nature of the case.

Lastly. I have to observe, that, to avoid unnecessary tautologies in speaking of the proportion that ought to subsist between the smaller cylinder or the steam measure and the larger cylinder, or the quantity of steam to be admitted to the working cylinder, where a separate smaller cylinder or steam measure is not adopted, though I have mentioned the regular proportions, as, for example, of a measure or quantity equal to one-fortieth of the working cylinder when steam of forty pounds the square inch is to be employed, or equal to one-thirtieth, or one-twentieth, when steam of thirty or twenty pounds the square inch is to be used; yet these are not the only proportions that may be used; for, though it may not be advisable that the proportion of the smaller cylinder or steam measure should in any case be made much smaller than I have stated, yet, in making it larger, considerable latitude may be allowed: for example, with steam of forty pounds the square inch, a smaller cylinder or measure of

one-twentieth, or even larger, or of some intermediate proportion, may be employed instead of one of a fortieth of the capacity of the larger or working cylinder; and so with steam of any other given strength. And it may be advisable, that in a number of engines this should be the case, because of the difficulty of preventing some waste of steam or partial condensation which might lessen the rate of working, if not allowed for in the size of the smaller cylinder or steam measure; or in the quantity of steam admitted directly from the boiler into the working cylinder, where no smaller cylinder or steam measure is employed: and in every case the engine, when got ready for work, whatever may be the proportion that has been adopted as intended to be worked with, should have its power tried, by altering the load on the valve that ascertains the force of the steam, in order that the strength of steam best adapted for the engine may be ascertained; for it may turn out to be advantageous that the steam should be employed, in particular engines of an elastic force, somewhat over or under what was first intended.

In witness whereof, &c.

Since that Mr. Woolf has made other improvements of which the following is a brief view taken from Vol. 23, p. 123, of Tilloch's Mag.

Account of Mr. Arthur Woolf's *new Improvements on Steam-Engines.*

In our nineteenth volume, p. 133, we gave a short account of a former improvement made by Mr. Woolf on the steam-engine, founded on a discovery that steam, of any higher temperature than that of boiling water, if allowed to pass into another vessel kept at the same temperature as the steam itself, will expand to as many times its volume, and still be equal to the pressure of the common atmosphere, as the number of pounds which such steam,

before being allowed to expand, could maintain on each square inch of a safety-valve exposed to the atmosphere: for example, that masses or quantities of steam of the expansive force of 20, 30, or 50 pounds the square inch of a common safety-valve, will expand to 20, 30, or 50 times its volume, and still be respectively equal to the atmosphere, or capable of producing a sufficient action against the piston of a steam-engine to cause the same to rise in the old engine (with a counterpoise) of Newcomen, or to be carried into the vacuous part of the cylinder in the improved engines first brought into effect by Messrs. Boulton and Watt.

In consequence of this discovery Mr. Woolf was enabled to use his steam twice (if he chose), and with complete effect; nothing more being necessary than to admit high steam, suppose of 40 pounds the square inch, into one cylinder, to work there by its expansive force, and then to allow the same steam to pass into, and expand itself in, another cylinder of forty times the size of the first, there to work by condensation in the common way. Or with only one cylinder, by admitting a proportionally small quantity of high steam into it from the boiler, Mr. Woolf found that he could effect a considerable saving in fuel.

In this first improvement of Mr. Woolf, though the saving might be carried a considerable length, it was still necessarily limited by the strength of materials; for in the employment of high steam there must always be some danger of an explosion. Mr. Woolf, however, by a happy thought, has completely obviated every danger of this kind, and can now take the full advantage of the expansive principle without the least danger whatever. This he effects by throwing into common steam the additional temperature necessary for its high expansion, *after the steam is admitted into the working cylinder*, which is heated by means adequate to the end intended to be obtained;

and the advantage which he thus gains he effectually secures by a most ingenious improvement in the piston. It may be easily conceived that steam of such high rarity as Mr. Woolf employs, could not be made fully effective with the piston in common use; for in proportion to its rarity so must be the facility with which a portion of it would escape, and pass by the side of the piston to the vacuous part of the cylinder: but Mr. Woolf's contrivance seems perfectly adapted to prevent the loss of even the smallest portion of the steam.

Besides these improvements on the common steam-engine, he has also found means to apply the same principles to the old engine, known by the name of Savary's, in such a way as to render the same a powerful and economical engine for a great variety of purposes.

Such is the outline of Mr. Woolf's improvements on this most useful engine: but, for the general information of practical engineers, we shall here subjoin a more technical description, in Mr. Woolf's own words, extracted from his specification of his patent.

"I have found out and invented a contrivance, by which the temperature of the steam vessel or working cylinder of a steam-engine, or of the steam vessels or cylinders where more than one are used, may be raised to any required temperature, without admitting steam from the boiler into any surrounding receptacle, whether known by the name of a steam case, or by any other denomination. That is to say, instead of admitting steam of a high temperature into such receptacle or steam case, which is always attended with a risk of explosion proportioned to the elasticity of the steam employed, I put into the said surrounding receptacle, or case, oil or the fat of animals, or wax, or other substances capable of being melted by a lower temperature than the heat intended to be employed, and of bearing that heat without being convert-

ed into vapour: or I put into the said case or cases mercury or mixtures* of metals, as of tin, bismuth, and lead, capable of being kept in a state of fusion in a lower temperature than that intended to be employed in working the steam-engine; and I so form the surrounding case or cases as to make it or them admit the aforesaid oil, or other substance employed, to come into contact not only with the sides of the steam vessel or vessels, or working cylinder or cylinders, but also with the bottom and top of the same, so that the whole may be as much as possible maintained at one uniform temperature; and this temperature I keep up by a fire immediately under or round the case or cases that contains the aforesaid oil or other substance, or by connecting the said case or cases with a separate vessel or vessels kept at a proper temperature, filled with the oil or other substance made use of as aforesaid. In some circumstances, or whenever the same may be convenient or desirable, I employ the fluid metals, or mixtures of metals, and oil or other of the substances before enumerated, at one and the same time in the same engine: that is to say, in the part of the case or vessel exposed to the greatest action of the fire, I sometimes have the aforesaid metals or mixtures of metals, and in the parts less exposed to the action of the fire, I put oil, or other substances capable of bearing the requisite heat without being converted into vapour.

"By this arrangement, and method of applying the surrounding heat, I not only obviate the necessity of employing steam of a great expansive force round the steam vessel or vessels, or the working cylinder or cylinders, as already mentioned, to maintain them at the temperature required, but I am enabled to obtain from steam of a comparatively low temperature, or even from water itself ad-

* Chancellor Livingston suggested this idea many years ago to Dr. Priestley. T. C.

mitted into the steam vessel or vessels, all the effects that can be obtained from steam of a high temperature, without any of the risk with which the production of the latter is accompanied, not only to the boiler and other parts of the machinery, but even to the lives of the workmen; for such low steam, or even water, (but in every case steam is preferable,) being admitted into a steam vessel or vessels, or working cylinder or cylinders, kept at the requisite higher temperature by the forementioned means, will there be expanded in any ratio required, and produce an effect in the working of the engine which cannot otherwise be obtained but at a greater expense of fuel, or with the risk of an explosion. By this means I can make use of steam expanded in any required ratio, or of any given temperature, without the necessity of ever having the steam of any greater elasticity than equal to the pressure of the common atmosphere.

" Another improvement which I make use of in steam engines consists in a method of preventing, as much as possible, the passage of any of the steam from that side of the piston which is acted upon by the said steam to the other side which is open to the condenser; and this I effect, in those steam engines known by the name of double engines, by employing upon or above the piston mercury or fluid metal, or metals in an altitude equal to the pressure of the steam. The efficacy of this arrangement will appear obvious, from attending to what must take place in working such a piston. When the piston is ascending, that is, when the steam is admitted below the piston, the space on its other side being open to the condenser, the steam endeavouring to pass up by the side of the piston is met and effectually prevented by the column of metal equal or superior to it in pressure, and during the down stroke no steam can possibly pass without first forcing all the metal through. In working what

is called a single engine, a less considerable altitude of metal is required, because the steam always acts on the upper side of the piston. For single engines, oil, or wax, or fat of animals, or similar substances, in sufficient quantity, will answer the purpose, if another improvement, which constitutes part of my said invention, be applied to the engine, namely, to take care that either in the double or single engine so to be worked, the outlet that conveys the steam to the condenser shall be so posited, and of such a size, that the steam may pass without forcing before it or carrying with it any of the metal or other substance employed, that may have passed by the piston; taking care at the same time to provide another exit for the metal or other substance collected at the bottom of the steam vessel or working cylinder to convey the same into a reservoir kept at a proper heat, whence it is to be conveyed to the upper side of the piston by a small pump worked by the engine or by any other contrivance. In order that the fluid metal or metals used with the piston may not be oxidated, I always keep some oil or other fluid substance on its surface, to prevent its coming in contact with the atmosphere and to prevent the necessity of employing a large quantity of fluid metal, I generally make my piston of the depth of the column required, but of a diameter a little less than the steam vessel or working cylinder, excepting where the packing or other fitting is necessary to be applied; so that, in fact, the column of fluid metal forms only a thin body round the piston. In some cases I make a hollow metallic piston, and apply an altitude fluid of metal in the inside of the same, to press its outside into contact with the steam vessel or working cylinder.

"It may be necessary, however, to state, that in applying my improved method of keeping the steam vessels of steam engines at any required temperature to the engine known by the name of Savary's, in any of its improved

forms, in which a separate condenser has been introduced, I sometimes employ oil (or any other substance lighter than water, and capable of being kept fluid in the temperature employed, without being converted into vapour,) in the upper part of the tube or pipe attached to the steam vessel: by which means steam of any temperature may be used without being exposed to the risk of partial condensation by the admission of any colder body into the steam vessel; for the oil, or other substance employed for this purpose, soon acquires the requisite temperature; and to prevent unnecessary escape of heat, I construct of, or line with, an imperfect conductor of heat, that part of the tube or pipe attached to the steam vessel which may not be heated exteriorly. And further, (as is already the practice in some engines, and therefore not exclusively claimed by me,) I cause the water raised by the engine to pass off through another ascending tube than the one attached to the steam vessel, but connected with it at some part lower than the oil or other substance employed in it is ever suffered to descend to in the working of the engine. The improvement which I have just mentioned, of introducing oil into the pipe attached to the steam vessel of such engines, may also be introduced without applying heat externally to the steam vessel; but in this case part of the effect which would otherwise be gained is lost."

Description of a Portable Steam Engine. By Mr. MATHEW MURRAY.

To Mr. NICHOLSON.

SIR,

I take the liberty of handing you the description of a portable steam engine of my construction, which you will have the goodness to insert in your Philosophical Journal. I will just observe it is reduced to the fewest parts that

practical utility will admit, which must necessarily render it of great advantage; as the simplicity of its parts make it nearly impossible to be out of order with a very moderate degree of management. The following description and reference to the plate will explain the nature of this engine.

I am, Sir,

Your much obliged humble servant,

MATHEW MURRAY.

Leeds, May 7th, 1805.

Description of a Portable Steam Engine.—Plate I.

AA. Represents the ground or floor on which the engine stands.

B. Section of a recess made in the ground for the beam O to work in.

C. Iron cistern resting upon the ground or floor covering the recess for the beam.

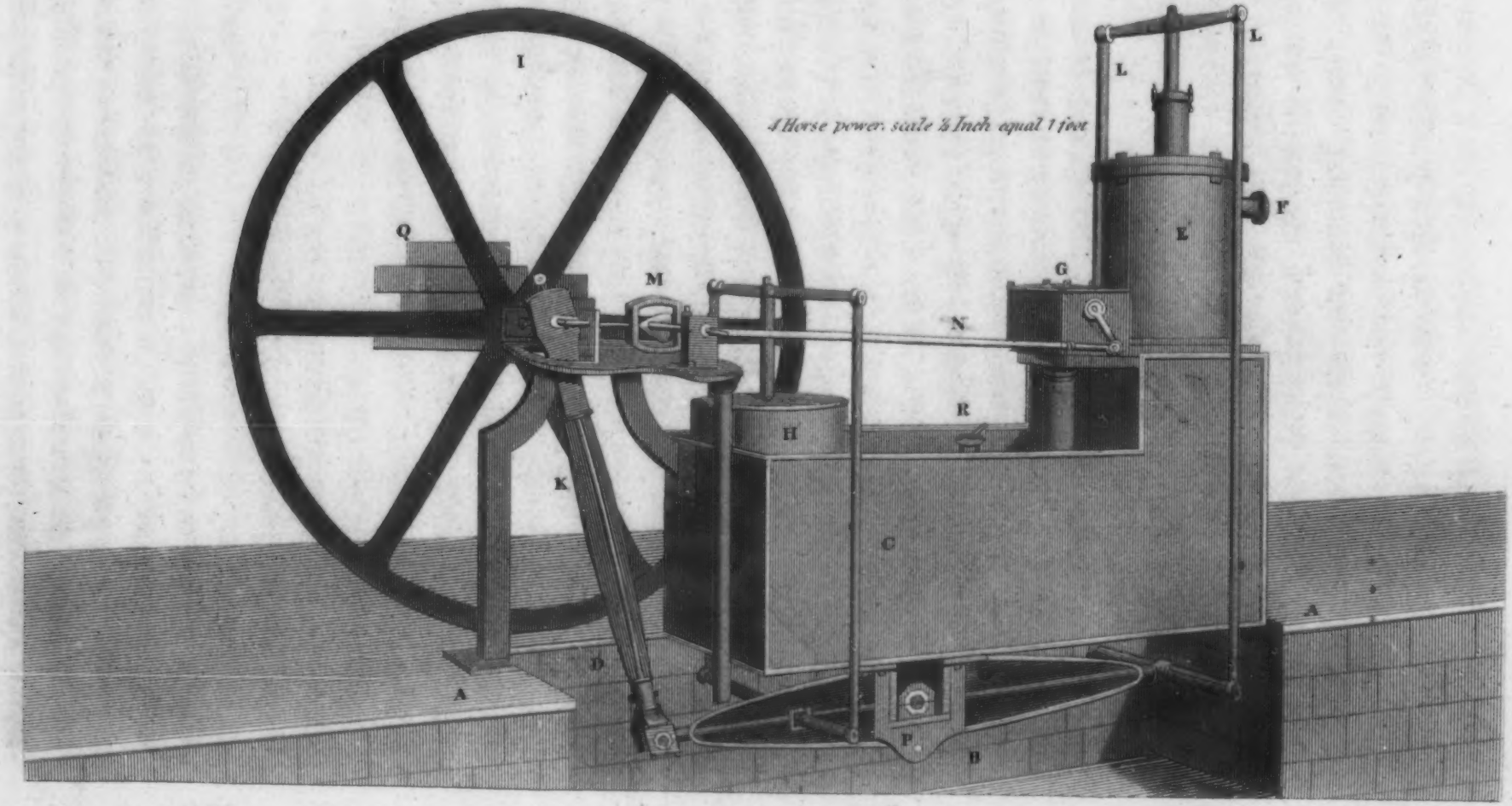
D. An opening in the floor to admit a boy to oil the centres of the beam.

E. A double steam cylinder, having an upright pipe in the intermediate space, which effects a communication between the top and bottom, and the valve box G.

F. A steam pipe that communicates with the boiler through which all the steam passes and surrounds the inner cylinder in its way to the valve box, prior to its application against the piston.

G. The valve box fixed upon a projection from the cylinder bottom, having an opening or connection with the interval between the two cylinders. In this opening is a regulating valve for adjusting the quantity of steam (that acts against the piston) in its passage through the valve box. There are also three other openings in the bottom of this valve box, one of which connects with the top of the cylinder by the pipe in the intermediate space, the second with the bottom, and the third with the educ-

Mr. Murray's portable Steam Engine.



C. Tiebout Sc.

tion pipe that leads to the condenser. Two of these openings are alternately connected together by a slide valve,* while the third is left open for the admission of steam to the piston, this valve changes its position at the end of each stroke of the piston, and performs all the purposes of the most complicated machine.

H. The air-pump connected with a condenser at the bottom of the eduction pipe.

I. The fly wheel fixed upon an axis which receives its motion from a crank connected with the beam by the rod K.

LL. Two rods for connecting the motion of the piston to the beam, these rods move perpendicularly by a motion which could not be conveniently shewn in this view without rendering it confused.

M. A spherical triangle turned by the crank for moving the slide valve by the horizontal rod N that connects them together. This motion has the advantage of preventing the engine from ever turning the contrary way round from that which it is wanted to go, and prevents the noise that is usually heard in engines.

O. The beam attached to the bottom of the cistern C by means of the hanging carriages P.

Q. A rest or fixture in a wall for the end of the fly wheel shaft; this will vary according to the situation where the engine is to be fixed, or it may be supported by a metal standard.

R. Index to the injection cock that admits water to the condenser. *Note*, The cistern is to be kept nearly full of water during the time the engine is at work.

The cylinder G and valve box E must be surrounded on all sides by a case, (not shewn in this view) the space between filled with charcoal to prevent the transmission of heat, which if effectually done will work with the least

* For these valves I took out a patent in 1802.

possible quantity of coals, as it combines the advantages of every other engine hitherto known. By detaching the air-pump and condenser (which may be done in half an hour) and where water cannot be had for condensation, this engine may be worked by the pressure of strong steam alone, as the internal cylinder is kept as hot as the steam in the boiler.* This dangerous plan never ought to be resorted to but in cases of necessity, as it is no saving of coals, and as there can be no certain rule when to discontinue the use of the boiler, the weakness of which is not prevented by putting the fire in a tube in the inside of it. This engine requires no framing nor mill-wright work in the fixing, but merely bolting down to the floor it stands upon. It takes up very little room, and all its parts are within reach, without the necessity of upper floors or stages, which would be the case if the beam was above; but by being fixed below and alone, it has no tendency to move from its situation.

Description of a portable Steam-engine, invented by Mr. SAMUEL CLEGG, *David Street, Manchester. Communicated by Mr.* DALTON, *Lecturer at the Royal Institution, &c.*

THIS engine is worked by four copper valves in the usual manner, but the mechanism for lifting them is very different from any hitherto made: there are no levers em-

* Many engines are at present worked in London and elsewhere by the mere force of steam, without condensation, under Trevethick's patent. The force is from 45 to 60 lbs. on the round inch; a pressure equal to about 25 fathoms of water at the most. Various assertions and reports concerning the safety, the economy, and the other effects of these engines have passed under my notice; but the interested situation of some of the narrators on both sides, and the short time of trial, have induced me to wait for more facts before I should give any account of the engine in this Journal. I hope to do this a few months hence.—W. N.

ployed for opening the valves, and there is no hand gear. The steam and exhaustion valves are on the same horizontal plane; those which are vertical to each other are not like those hitherto used, both exposed to the steam or both to a vacuum; but by a simple contrivance in the construction of the nozzles, the one is exposed to the steam while the other has a communication with the condensing vessel. From what has been said it may easily be perceived, if the two valves be connected together by a straight rod, that when this rod is lifted, the pressure is given to the piston, and the machine is put into motion; and if the other two valves be connected in the same manner and lifted at an appointed time, the engine is kept in motion. The outside appearance of these nozzles may be seen at *Fig.* 1. *c c*, *(Plate* II.*)* The rods which come out of the bottom of the nozzles are kept tight by vertical stuffing-boxes, the whole of which is hid in the drawing by the frame.

The next is a new contrivance for producing a rotative motion from a reciprocating one, which not only simplifies the machine very much, but exceeds the power of the common crank by nearly one-third, in consequence of its acting always perpendicular to the radius of the wheel, which is done by a rock and wheel, as represented by *Fig.* 2 and 3; and as this plan of connection distributes the power uniformly, of course a much lighter fly-wheel is required, which diminishes friction, &c.

Explanation of the Plate.

Fig. 1. is a representation of the engine: one of the corner columns AA, which supports the frame, serves likewise for an eduction-pipe and condensing-vessel: the air-pump E is joined to the condensing vessel by the pipe D; *e* is the piston rod, and though it works out at the bottom of the cylinder, it is as easily kept tight as if it worked out at the top; *b* is a similar rod which keeps the

rack perpendicular; *a a* are the two radius bars on which the brasses are fixed that support the shaft; by this contrivance the wheel C easily moves from one side to the other of the rack F.

Fig. 2. is a view of the rack on a larger scale, where C represents the wheel and D the shaft; E E, a sliding bar, on which is fixed the small roller *o*, serving as a connecting link to keep the wheel C always in gear; for, when the wheel is in gear on the opposite side of the rack, the roller *o* is on the other side of the plate *a a;* but it will perhaps be more clearly understood by the plan, *Fig.* 3. where the letters represent the same movement as in the elevation, *Fig.* 2: This description may be easily understood by those who already possess a little knowledge of a steam-engine.

Description of a Steam Engine on the Principle of Savary, operating by a separate Condenser; with other essential Improvements. By Mr. JOHN NANCARROW*.

Plate III. Fig. 3. A. The receiver, which may be made either of wood or iron.

BBBB. Wooden or cast-iron pipes for conveying the water to the receiver, and from thence to the penstock.

C. The penstock or cistern.

D. The water-wheel.

E. The boiler, which may be either iron or copper.

F. The hot-well for supplying the boiler with water.

GG. Two cisterns under the level of the water, in which the small bores BB, and the condenser are contained.

HHH. The surface of the water with which the steam engine and water wheel are supplied.

* From a learned paper on Mills, in the American Transactions, IV. page 356. I have not been able to extract the theoretical parts of the paper, because the plates and references are too imperfect.

Fig. 3.

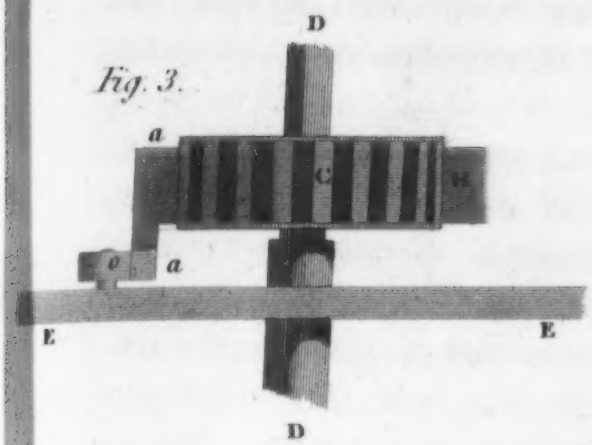
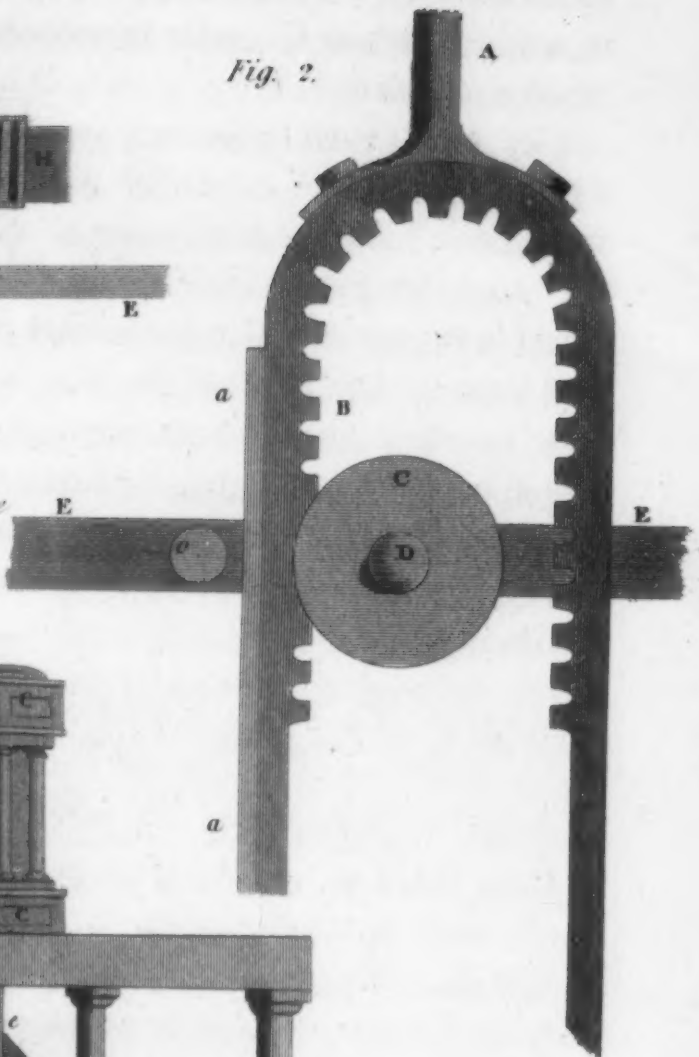
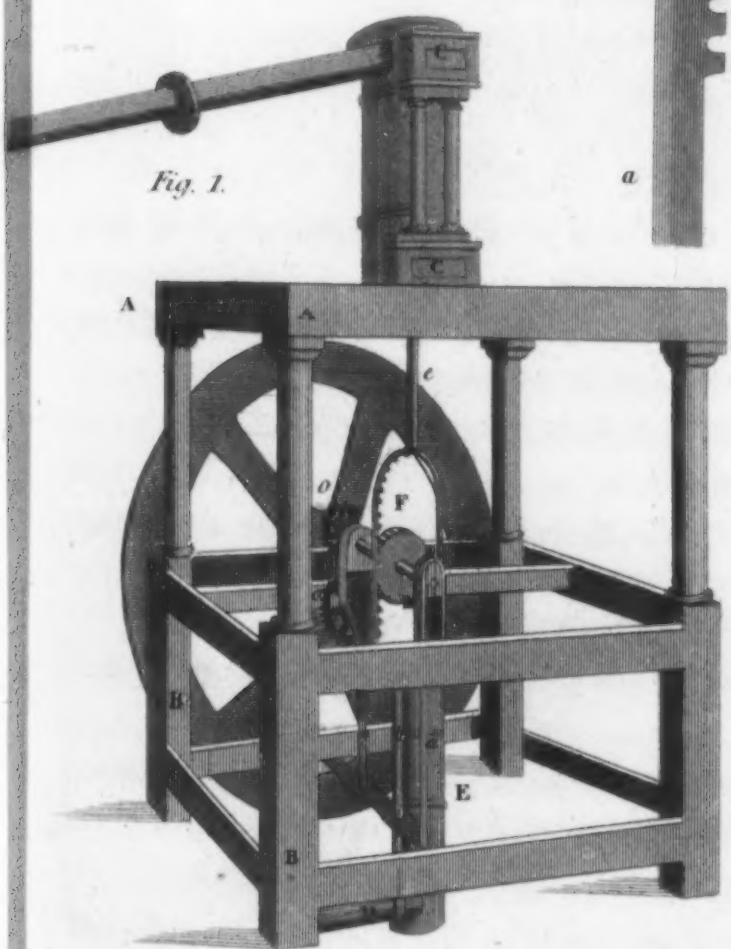


Fig. 2.



Portable Steam Engine
by Mr. Saml. Clegg.

Fig. 1.



Tiebout sc.

M.r John Nancarrow's improved steam engine on Savarys principles with a separate condenser, &c. &c.

Fig. 2.

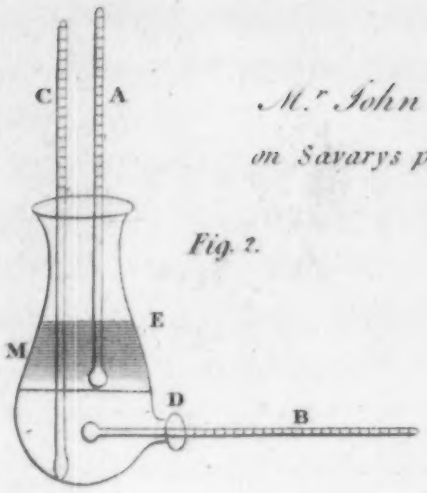
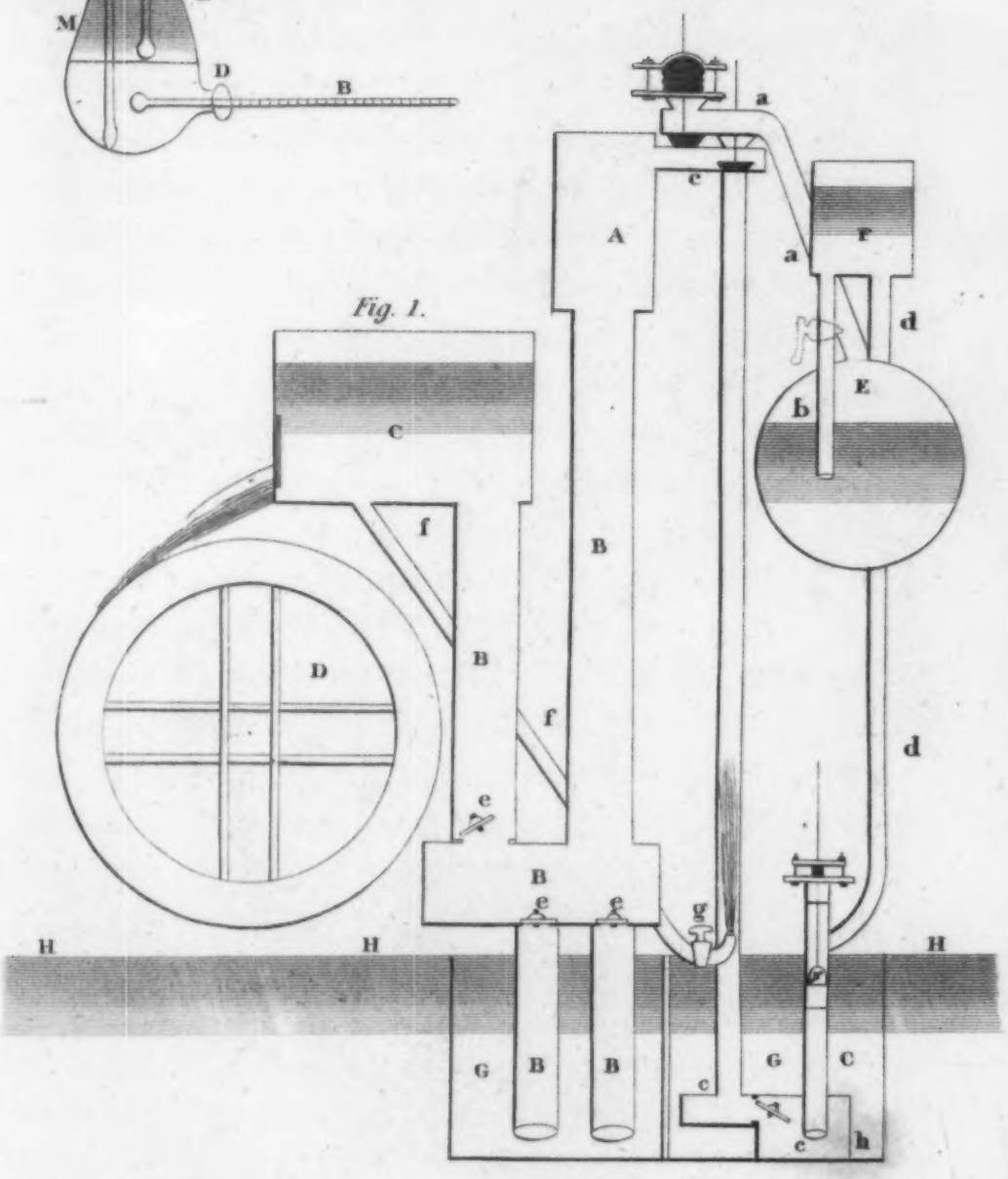


Fig. 1.



Tiebout sc.

aa. The steam-pipe, through which the steam is conveyed from the boiler to the receiver.

b. The feeding-pipe, for supplying the boiler with hot water.

ccccc. The condensing apparatus.

dd. The pipe which conveys the hot water from the condenser to the hot-well.

eee. Valves for admitting and excluding the water.

ff. The injection pipe, and *g* the injection cock.

h. The condenser.

It does not appear necessary to say any thing here on the manner in which this machine performs its operations without manual assistance, as the method of opening the cocks by which the steam is admitted into the receiver and condensed, has been already well described by several writers. But it will be necessary to remark that the receiver, penstock, and all the pipes, must be previously filled* before any water can be delivered on the wheel, and when the steam in the boiler has acquired a sufficient strength, the valve at *c* is opened, and the steam immediately rushes from the boiler at E into the receiver A, the water descends through the tubes A and B, and ascends through the valve *e* and the other pipe or tube B into the penstock C. This part of the operation being performed and the valve *c* shut, that at *a* is suddenly opened, through which the steam rushes down the condensing pipe *c*, and in its passage meets with a jet of cold water from the injection cock *g*, by which it is condensed. A vacuum being made by this means in the receiver, the water is driven up to fill it a second time through the valves *ee*, by the pressure of the external air, when the steam-valve at *c* is again opened, and the operation repeated for any length of time the machine is required to work.

* Or the air blown out by steam; which may perhaps be less convenient than the method in the text.—N.

There are many advantages which a steam-engine on this construction possesses, beyond any thing of the kind hitherto invented; a few of which I shall beg leave to enumerate.

1. It is subject to little or no friction.

2. It may be erected at a small expence when compared with any other sort of steam-engine.

3. It has every advantage which may be attributed to Boulton and Watt's engines, by condensing out of the receiver, either in the penstock or at the level of the water.

4. Another very great advantage is, that the water in the upper part of the pipe* adjoining the receiver, acquires a heat by its being in frequent contact with the steam, very nearly equal to that of boiling water; hence the receiver is always kept uniformly hot as in the case of Boulton and Watt's engines.

5. A very small stream of water is sufficient to supply this engine, (even where there is no fall) for all the water raised by it is returned into the reservoir HHH.

From the foregoing reasons it manifestly appears that no kind of steam-engine is so well adapted to give rotatory motion to machinery of every kind as this. Its form is simple, and the materials of which it is composed are cheap; the power is more than equal to any other machine of the kind, because there is no deduction to be made for friction, except on account of turning the cocks, which is but trifling.

Its great utility is therefore evident in supplying water for every kind of work performed by a water-wheel, such as grist-mills, blast-furnaces, forges, &c.

* Not being thrown out by a side aperture, as in Plate XVII. Vol. I. of our Journal, but merely raised and depressed in the pipe AB—N. *(4 Nich. Jour. qto. 545.)*

Oliver Evans's Columbian Steam Engine.

Explanation.

A, the boiler—B, the working cylinder—C, the lever beam—D, the fly-wheel—E, the condenser—F, the water-pump—G, the supply pump—H, the furnace—I, the chimney flue—K, the safety-valve, which may be loaded with 100 or 150*lbs.* to the inch area; it will never need more, and it must never be fastened down.

Operation.

The boiler being filled with pure water as high as the dotted line, and the fire applied, the smoke enters the centre flue which passes through the centre of the water to ascend the flue I, and thus acts on a large surface.

When the steam lifts the safety-valve, it is then let into the cylinder by opening the throttle-valve, to drive the piston up and down, which, by rod 1, gives motion to the fly-wheel, and wheel 2 gives motion to a shaft, passing through the posts, to turn the spindle of the rotary-valves 3, 8, which lets the steam both off and on the cylinder at the proper time.

The steam escaping by pipe 4, curved and immersed in the water in box E, which is supplied by pump F, it is condensed, and the water formed, descends by pipe 5, into supply pump G, and is forced into the boiler again by pipe 6.

But boiling decomposes water slowly changing it into air incondensible. Therefore the shifting-valve 7, is necessary. This valve lifts at every puff of steam, and a small quantity of air escapes; and it shuts, and a vacuum is instantly formed, as the crank passes the dead points.

The small waste of water may be supplied by condensing part of the steam rising from the condensing water, to run down the pipe 9, through a hole in the key of a stop-

cock, $\frac{1}{12}$ parts of an inch diameter.—A small hole indeed to supply a boiler of twenty horses power.

No sediment can accumulate in the boiler, it being supplied by distilled water. Therefore it will last much longer, and require less fuel than others. Muddy, lime-stone, or salt water, or the juice of the sugar cane, &c. &c. may be used to condense; and as the engine works equally well while we boil away the condensing water, we may boil for salt, sugar, &c. in working the engine,—thus using the fuel for double purposes.

If the steam be confined by the load on the safety-valve, to raise its power to 100 pounds to the inch, area of the piston and the cylinder be nine inches in diameter, and the stroke of the piston three feet, the power will equal twenty horses hitched; and will grind 20 bushels of grain per hour, or saw 5000 feet of boards in 12 hours. If the steam be confined by 150 pounds, the power of the engine will be equal to 30 horses, when the steam is shut off at one third of the stroke, and striking 36 strokes per minute.—Double strokes double the power.

The more the steam is confined, and the shorter it be shut off by the regulator 8, the greater will be the power obtained by the fuel. For every addition of 30 degrees heat to the water doubles the power. So that doubling the heat of the water increases the power about 100 times. On these principles fuel may be lessened to one third part consumed by other engines. This engine is not more than one fourth the weight of others; is more simple, durable, and cheap, and more suitable for every purpose; especially for propelling boats and land carriages. It requires no more water than the fuel will evaporate in steam, and this steam may be employed to warm the apartments of factories; or the condenser E, could be used as a still to distill spirits; or a vat for paper making, boiler in a brewery, dye factory, &c. &c.

The patent right now belongs one half to the subscriber, Philadelphia; one fourth to George Evans, Pittsburgh; and one fourth to Luther Stephens, Lexington, Ky. Apply to either for engines, or for licences to use them.

OLIVER EVANS.

On the origin of Steam Boats and Steam Wagons.

BY OLIVER EVANS.

About the year 1772, being then an apprentice to a wheel-right, or wagon-maker, I laboured to discover some means of propelling land carriages, without animal power. All the modes that have since been tried (so far as I have heard of them) such as wind, treadles with ratched wheels, crank tooth, &c. to be wrought by men, presented themselves to my mind, but were considered as too futile to deserve an experiment; and I concluded that such motion was impossible for want of a suitable original power.

But one of my brothers, on a Christmas evening, informed me that he had that day been in company with a neighboring blacksmith's boys; who, for amusement, had stopped up the touch-hole of a gun barrel, then put in about a gill of water and rammed down a tight wad—after which they put the breech in the smith's fire; when it discharged itself with as loud a *crack* as if it had been loaded with powder.

It immediately occurred to me that here was the power to propel any wagon, if I could only apply it; and I sat myself to work to find out the means. I laboured for some time without success. At length a book fell into my hands describing the old atmospheric *steam engine*. I was astonished to observe that they had so far erred as to use the steam only to form a vacuum to apply the mere pressure of the atmosphere, instead of applying the elastic power of the steam for original motion; the power of which I supposed irresistible.

I renewed my studies with increased ardor, and soon declared that I could make *steam wagons*, and endeavored to communicate my ideas to others; but however practicable the thing appeared to me, my object only excited the ridicule of those to whom it was made known. But I persevered in my belief, and confirmed it by experiments that satisfied me of its reality.

In the year 1786, I petitioned the legislature of *Pennsylvania* for the exclusive right to use my improvements in flour mills, as also steam wagons, in that state. The committee to whom the petition was referred, heard me very patiently while I described the *mill* improvements, but my representations concerning *steam wagons* made them think me insane. They, however, reported favorably respecting my improvements in the manufacture of flour, and passed an act granting me the exclusive use of them as prayed for. This act is dated March——, 1787. But no notice is taken of the steam wagons.

A similar petition was also presented to the legislature of *Maryland*, Mr. *Jesse Hollingsworth*, from *Baltimore*, was one of the committee appointed to hear me, and report on the case. I candidly informed this committee of the fate of my application to the legislature of *Pennsylvania*, respecting the steam wagons—declaring, at the same time, without the encouragement prayed for, I would never attempt to make them; but that, if they would secure to me the right as requested, I would, as soon as I could, apply the principle to practice; and I explained to them the great elastic power of steam, as well as my mode of applying it to propel wagons. Mr. *Hollingsworth* very prudently observed, that the grant could injure no one, for he did not think that any man in the world had thought of such a thing before: he therefore wished the encouragement might be afforded, as there was a prospect that it would produce something useful.

This kind of argument had the desired effect, and a favorable report was made, May 21, 1787, granting to me, my heirs and assigns, for 14 years, the exclusive right to make and use my improvements in flour mills, and the steam wagons, in that state. From that period I have felt myself bound in honour to the state of *Maryland* to produce a steam wagon, as soon as I could conveniently do it.

In the year 1789, I paid a visit to *Benjamin Chandlee*, and sons, clockmakers, men celebrated for their ingenuity, with a view to induce them to join me in the expence and profits of the project. I shewed to them my draughts with the plan of the engine, and explained the expansive power of steam ; all which they appeared to understand, but fearful of the expence and difficulties attending it, declined the concern. However they certified that I had shewn to them the drawings and explained the powers, &c.

In the same year, I went to *Ellicott's* mills on the *Petapsco*, near *Baltimore*, for the purpose of persuading Messrs. *Jonathan Ellicott* and brothers, and connections, (who were equally famous for their ingenuity,) to join me in the expence and profits of making and using steam wagons. I also shewed to them my drawings, and minutely explained to them the powers of steam. They appeared fully to comprehend all I said, and in return informed me of some experiments they themselves had made, one of which they shewed me. They placed a gun-barrel, having a hollow arm, with a small hole on one side at the end of the arm, similar to *Barker's* rotary tube mill, as described in the books ; a gill of water put into this barrel, with fire applied to the breech, caused the steam to issue from the end of the arm with such force, as, by re-action, to cause the machine to revolve, as I judged, about one thousand times in a minute, for the

space of about five minutes, and with considerable force for so small a machine. I tarried here two days (May 10 and 11, 1789) using my best efforts to convince them of the possibility and practicability of propelling wagons, on good turnpike roads, by the great elastic power of steam. But they also feared the expence and difficulty of the execution, and declined the proposition. Yet they heartily esteemed my improvements in the manufacture of flour, and adopted them in their mills, as well as recommended them to others.

In the same year I communicated my project and explained my principles, to *Levi Hollingsworth*, Esq. now a merchant in Baltimore.* He appeared to understand them; but also declined a partnership in the scheme, for the same reasons as the former.

From the time of my discovering the principles and the means of applying them, I often endeavoured to communicate them to those I believed might be interested in their application to wagons or boats. But very few could understand my explanations, and I could find no one willing to risque the expence of the experiment.

In the year 1785 or 6, before I had petitioned the legislature, I fell in company with Mr. Samuel Jackson, of Redstone; and learning of him that he resided on the

* I certify that Oliver Evans did about the year 1789, communicate a project to me, of propelling land carriages by power of steam, and did solicit me to join him in the costs and profits of the same.

LEVI HOLLINGSWORTH.

Baltimore, November 16, 1812.

I do certify, that some time about the year 1781, 31 years ago, Oliver Evans, in conversation with me, declared, that by the power of steam he could drive any thing—wagons, mills, or vessels forward, by the same power, &c.

ENOCH ANDERSON.

November 15, 1812.

western waters, I endeavoured to impress upon his mind, the great utility and high importance of *steam boats*, to be propelled on them; telling him that I had discovered a steam engine so powerful according to its weight, that it would, by means of *paddle wheels* (which I described to him) readily drive a vessel against the current of those waters with so great speed as to be highly beneficial. Mr. Jackson proves that he understood me well, for he has lately written letters, declaring, that about twenty-six years before their date, I did describe to him the principles of the steam engine that I have since put into operation to drive mills, which he has seen—and that I also explained to him my plan for propelling boats by my steam engine, with *paddle wheels*, describing the very kind of wheels now used for this purpose; and that I then declared to him my intention to apply my engine to this particular object, as soon as my pecuniary circumstances would permit.

In the year 1800 or 1801, never having found a man willing to contribute to the expence, or even to encourage me to risque it myself, it occurred to me that though I was then in full health, I might be suddenly carried off by the yellow fever, that had so often visited our city, (Philadelphia) or by some other disease or casualty, to which all are liable, and that I had not yet discharged my debt of honour to the state of *Maryland*, by producing the steam wagon. I determined, therefore, to set to work the next day and construct one. I first waited upon *Robert Patterson*, esq. professor of mathematics in the university of Pennsylvania, and explained to him my principles, as I also did to Mr. *Charles Taylor*, steam engineer, from England. They both declared these principles to be new to them, and highly worthy of a fair experiment, advising me without delay to prove them; in hopes I might produce a more simple, cheap and pow-

erful steam engine than any in use. These gentlemen were the only persons who had such confidence, or afforded me such advice. I also communicated my plans to *B. H. Latrobe*, esq. at the same time; who publicly pronounced them chimerical, and attempted to demonstrate the absurdity of my principles, in his report to the *Philosophical society of Pennsylvania*, on steam engines; in which same report he also attempts to shew the impossibility of making steam boats useful, on account of the weight of the engine; and I was one of the persons alluded to, as being seized with the *steam mania*, conceiving that wagons and boats could be propelled by steam engines. The liberality of the members of the society caused them to reject that part of his report which he designed as demonstrative of the absurdity of my principles; saying they had no right to set up their opinion as a stumbling block in the road of any exertions to make a discovery. They said, I might produce something useful, and ordered it to be stricken out. What a pity they did not also reject his demonstrations respecting steam boats! for notwithstanding them, they have run, are now running, and will run: so has my engine and all its principles, completely succeeded—and so will land carriages, as soon as these principles are applied to them, as explained to the legislature of *Maryland*, in 1787, and to others long before.

In consequence of the determination above alluded to, I hired hands and went to work to make a steam wagon, and had made considerable progress in the undertaking, when the thought struck me that as my steam engine was entirely different in form as well as in its principles from all others in use, that I could get a patent for it, and apply it to mills more profitably than to wagons; for until now I apprehended that as steam mills had been used in England, I could only obtain a patent for wagons and

boats. I stopped the work immediately, and discharged my hands, until I could arrange my engine for mills, laying aside the steam wagon for a time of more leisure.

Two weeks afterwards, I commenced the construction of a small engine for a mill to grind plaister of Paris—the cylinder six inches in diameter, and stroke of the piston eighteen inches—believing that with $ 1000, I could fully try the experiment. But before I was done with experiments, I found that I had expended $ 3,700—all that I could command. I had now to begin the world anew at the age of forty-eight, with a large family to support. I had calculated that if I failed in my experiment, the credit I had would be entirely lost; and without money or credit, at my advanced age, with many heavy incumbrances, my way through life appeared dark and gloomy indeed. But I succeeded perfectly with my little engine, and preserved my credit. I could break and grind 300 bushels of plaister of Paris, or 12 tons, in 24 hours; and to shew its operations more fully to the public, I applied it to saw stone on the side of Market-street, where the driving of twelve saws, in heavy frames, sawing at the rate of 100 feet of marble stone in 12 hours, made a great shew, and excited much attention. I thought this was sufficient to convince the thousands of spectators of the utility of my discovery: but I frequently heard them enquire if the power could be applied to saw timber as well as stone, to grind grain, propel boats, &c. and though I answered in the affirmative, I found they still doubted. I therefore determined to apply my engine to all new uses, to introduce it and them to the public.

This experiment completely tested the correctness of my principles, according to my most sanguine hopes. The power of my engine rises in a geometrical proportion, while the consumption of fuel has only an arithmetical ratio; in such proportion that every time I added

one-fourth more to the consumption of fuel, the powers of the engine were doubled; and that twice the quantity of fuel required to drive one saw would drive 16 saws, at least; for when I drove two saws the consumption was 8 bushels (coal) in 12 hours, but when 12 saws were driven, the consumption was not more than 10 bushels; so that the more we resist the steam the greater is the effect of the engine. On these principles, very light, but powerful engines, can be made, suitable for propelling boats and land carriages, without the great incumbrance of their own weight, as mentioned in Mr. *Latrobe's* demonstrations.

In the year 1804, I constructed at my works, situate a mile and a half from the water, by order of the board of health of the city of Philadelphia, a machine for cleansing docks. It consisted of a large flatt, or scow, with a steam engine of the power of five horses on board, to work machinery to raise the mud into flatts. This was a fine opportunity to shew the public that my engine could propel both land and water carriages, and I resolved to do it. When the work was finished, I put wheels under it; and though it was equal in weight to *two hundred barrels of flour*, and the wheels fixed with wooden axletrees, for this temporary purpose, in a very rough manner, and with great friction, of course, yet with this small engine I transported my great burthen to the *Schuylkill* with ease; and when it was launched in the water, I fixed a paddle wheel at the stern, and drove it down the *Schuylkill*, to the *Delaware*, and up the *Delaware* to the city, leaving all the vessels going up behind me, at least, half way; the wind being a-head.

Some wise men undertook to ridicule my experiment of propelling this great weight on land, because the motion was too slow to be useful. I silenced them by answering, that I would make a carriage, to be propelled

by steam, for a bet of $ 3000, to run upon a level road against the swiftest horse they would produce. I was then as confident, as I am now, that such velocity could be given to carriages.

Having no doubt of the great utility of steam carriages on good turnpike roads, with proper arrangements for supplying them with water and fuel, and believing that all turnpike companies were deeply interested in putting them into operation, because they would smooth and mend the roads, instead of injuring them as the narrow wheels do, on the 26th of September, 1804, I submitted to the consideration of the Lancaster turnpike company, a statement of the costs and profits of a steam carriage to carry 100 barrels of flour, 50 miles in 24 hours—tending to shew, that one such steam carriage would make more nett profits than 10 wagons drawn by five horses each, on a good turnpike road, and offering to build such a carriage at a very low price. My address closed as follows:

"It is too much for an individual to put in operation, every improvement which he may invent.

"I have no doubt but that my engines will propel boats against the current of the Mississippi, and wagons on turnpike roads, with great profit. I now call upon those whose interest it is, to carry this invention into effect. All which is respectfully submitted for your consideration."

In the year 1805, I published a book describing the principles of my steam engine, with directions for working it, when applied to propel boats against the current of the *Mississippi*, and carriages on turnpike roads. And I am still willing to make a steam carriage that will run 15 miles an hour, on good level rail-ways, on condition that I have double price if it shall run with that velocity, and nothing for it, if it shall not come up to that velocity. What

can an inventor do more than to insure the performance of his inventions? Or, I will make the engine and apparatus, at a fair price, and *warrant* its utility for the purpose of conveying heavy burthens on good turnpike roads.

I feel it just to declare that, with Mr. *Latrobe*, I myself did believe, that with the ponderous and feeble steam engine, now used in boats, they could never be made useful in competition with sail boats, or to ascend the *Mississippi*, esteeming the current more powerful than it is. But I rejoice that, with him I have been mistaken; for I have lived to see boats succeed well with those engines; and I still hope to see them so completely excelled and out-run by using my engines, as to induce the proprietors to exchange the old for the new, more cheap and more powerful principles.

I have been highly delighted in reading a correspondence between *John Stevens*, Esq. and the commissioners appointed by the legislature of *New York*, for fixing on the scite of the great canal proposed to be cut in that state. Mr. *Stevens* has taken a most comprehensive and very ingenious view of this important subject, and his plan of rail-ways for the carriages to run upon, removes all the difficulties that remained. I have had the pleasure, also, of hearing gentlemen of the keenest penetration, and of great mechanical and philosophical talents, freely give into the belief, that steam carriages will become very useful. Mr. *John Ellicott*, (of John) proposed to make roads of substances, such as the best turnpikes are made with, with a path for each wheel to run on, having a rail-way on posts in the middle to guide the tongue of the wagon, and to prevent any other carriage from travelling on it. Then, if the wheels were made broad and the paths smooth, there would be very little wear. Such roads might be cheaply made; they would last a long time, and

require very little repair. Such roads, I am inclined to believe, ought to be preferred, in the first instance, to those proposed by Mr. *Stevens;* as two ways could be made, in some parts of the country, for the same expence as one could be with wood. But either of the modes would answer the purpose, and the carriages might travel by night as well as in the day.

When we reflect upon the obstinate opposition that has been made by a great majority to every step towards improvement; from bad roads to turnpikes, from turnpikes to canals, from canals to rail-ways for horse carriages, it is too much to expect the monstrous leap from bad roads to rail-ways for steam carriages, at once. One step in a generation is all that we can hope for. If the present shall adopt canals, the next may try the rail-ways with horses, and the third generation use the steam carriages.

But why may not the present generation, who have already good turnpikes, make the experiment of using steam carriages upon them? They will assuredly effect the movement of heavy burthens, with a slow motion, of two and a half miles an hour; and as their progrees need not be interrupted, they may travel fifty or sixty miles in the 24 hours.—This is all that I hope to see in my time, and though I never expect to be concerned in any business requiring the regular transportation of heavy burthens, [on land] because if I am connected in the affairs of a mill it shall be driven by steam, and placed on some navigable water, to save land carriage—yet I certainly intend as soon as I can make it convenient, to build a steam carriage that will run on good turnpike roads, on my own account, if no other person will engage in it; and I do verily believe that the time will come when carriages propelled by steam will be in *general use*, as well for the transportation of passengers as goods, travelling at the rate of fifteen miles an hour, or 300 miles per day.

It appears necessary to give the reader some idea of the principles of the steam engine which is to produce such novel and strange effects; and this I will endeavour to do in as few words as I can, by shewing the extent to which the principles are applied already.

To make a steam as irresistible, or powerful as gunpowder, we have only to confine and increase the heat by fuel to the boiler. A steam engine with a working cylinder only nine inches in diameter, and a stroke of the piston three feet, will exert a power sufficient to lift from 3,000 to 10,000 pounds perpendicularly, two and a half miles per hour. This power applied to propel a carriage on level roads or rail-ways, would drive a very great weight with much velocity, before the friction of the axletree or resistance of the atmosphere would balance it.

This is not speculative theory. The principles are now in practice, driving a saw-mill at *Manchacks* on the Mississippi; two at *Natchez*, one of which is capable of sawing 5000 feet of boards in 12 hours; a mill at *Pittsburgh*, able to grind 20 bushels of grain per hour; one at *Marietta* of equal powers; one at *Lexington*, (Ky.) of the same powers; one a paper-mill, of the same; one of one fourth the power at *Pittsburgh:* one at the same place of 3½ times the power, for the forge, and for rolling and splitting sheet iron; one of the power of 24 horses at *Middletown*, (Con.) driving the machinery of a cloth manufactory; two at *Philadelphia* of the power of five or six horses, and many making for different purposes; the principles applying to all purposes where power is wanted.

OLIVER EVANS.

Ellicott's Mills on the Patapsco,

Nov. 13, 1812.

A new fire engine.—Make a small engine of tin and leather, to contain one cubit foot, or 6 gallons of water, which weighs 62½ lbs. with a piston to project the water

through a pipe to be guided by the hand. This may be carried by a man on his breast, hung by straps round his neck and must have two stirrups pending from the lower end of the piston rod.

Fifty men thus equipped, who would on an alarm, proceed immediately to the fire, and on their way fill their engines and ascend to the roof, or upper loft, or as the case may be, to come near the fire; then by stooping and putting their feet in the stirrups, and straightening themselves, they might exert such force as to eject the water thirty feet, horizontally, or fifteen feet perpendicularly, to strike the burning materials. Three hundred gallons of water, early applied and so immediately powerful to the spot wanting it, would extinguish most fires before the great engines could get into play. But the great engines must be preserved, and used on other occasions. O. E.

Extract from the (Philadelphia) Democratic Press of January 28, 1813.

"An experiment was lately made in Charles River, near Boston, to shew the velocity of a steam boat, constructed for the conveyance of passengers, &c. in the Middlesex canal. The boat was driven seven miles and six furlongs in sixty minutes; and there is no doubt by the best informed that it will go nine miles."

The steam engine in the said boat was constructed by Oliver Evans, on his improved principles adapted to the purpose of propelling boats and land carriages; and which he is convinced, will propel boats ten miles and upwards per hour, through still water.

The improvements made by Mr. Watt, may be summed up thus,

1st. Condensing the steam in a vessel separate and at a distance from the cylinder, which is now no longer

cooled by the injection water, as in Newcomen's or the atmospheric engine.

2dly. Making an approach to a vacuum by pumping out the air, which always, to a certain degree, accompanies the steam, and by its elasticity re-acts against the under side of the piston.

3dly. Keeping the outside of the cylinder in which the piston works, hot, by the intervention of steam between it and a casing.

4thly. The parallel motion of the beam, by which the stiff upwright rod attached to the beam and the piston presents its perpendicularity during the stroke.

5thly. Depressing the piston by steam instead of the atmosphere.

6thly. Keeping the top of the piston hot by the casing between the piston and the outward air, so that the steam let on above, is of the same temperature always as that below.

7thly. Consuming the smoke of the fuel, by making it pass through and over the red-hot coals.

8thly. Supplying the boiler with the hot injection water.

9thly. The application of the steam pipe above the water in the boiler, to ascertain when the water is too high: and the mode of opening the valve of the feeder, when the water sinks too low in the boiler; by the floating stone instead of the ball-cock.

10thly. The circular motion communicated to the fly wheel by means of the sun and planet wheels.

Mr. Cartwright's improvements consist in

1st. The method of giving the necessary perpendicular motion to the piston rod.

2dly. The condensing the steam by expanding it in a thin surface between metal balls cooled with water inside and outside, so that a great surface of steam is exposed

to the action of cold, in the manner as a great surface of air is admitted to the wick of Argand's lamp.

3dly. The accurate fitting of the metal piston to the cylinder by means of springs, which saves much trouble and expence in packing.

4thly. As all the steam is brought back into the boiler, it enables us to use ardent spirits, if necessary.

An account and drawing of Cartwright's engine may be seen in 1 Tilloch's Phil. Mag. 1.

I do not find, however, that Cartwright's engines are much in use.

Mr. Hornblower's improvements do not seem to consist in the adaption of any new principle, for reasons stated by professor Robison, in the article steam engine, in the Edinburgh Encyclopedia, p. 771, but in the methods used to make his collars air tight, in the structure of his condensing vessel, and the framing of his beam. A plate of Hornblower's engine is given by professor Robison in that article, and by Dr. Gregory in the 2nd vol. of his mechanics.

The improvements introduced by Mr. Woolf consist in

1st. His ascertaining the law of the expansion of steam, by a volume for each pound per square inch on the safety-valve: hence

2dly. In his using steam at much higher temperature than in the common engine: and

3dly. In his using it twice over in separate cylinders; though this idea seems to have occurred also to Mr. Hornblower.

4thly. In applying heat to the hot steam in the second cylinder: and using as the metalline substances as the mean of communicating and preserving heat to the steam.

5thly. In the form of his boilers, of which I shall give

a drawing in my next number, as I apprehend it is a great improvement on the common form.

But there is some similarity to Mr. Woolf's ideas in the patents of Mr. Sadler and Mr. Trevethick, as will appear from the description of his engine in the second volume of Nicholson's Journal, quto. series, p. 231.

Mr. Sadler's improvements consist in

1st. His working without a lever or beam.

2dly. Part of the steam previous to condensation, is employed a second time in another cylinder, the piston of which is depressed by the atmosphere. By this second application, it performs the office of an air pump, and adds to the total force of the machine.

Mr. Trevethick's engine worked by the force of a column of water inclosed in a pipe, may be understood from the description of it in 1 Nicholson's Journal, 8vo. p. 161. But his steam engine appears to be worked by steam of very high temperature, which is not condensed but permitted to escape.

The article "Steam Engine," to be concluded in the next.

INSRUCTIONS FOR PARENTS.

By Ch. Gotth. Salzmann.

'1. How to make yourself hated by your children.—Treat them with injustice, their hatred will naturally follow. Or this purpose may be effected by one parent's setting the children against the other.' Mr. S. here instances the very common practice of mothers threatening children with being punished by their father, or condoling with them when their father has corrected them. 'Be insensible to the caresses of your children, or take no share

in their pleasures, and they will soon feel an aversion to you. Deny your children innocent gratifications. Treat the little mistakes of your children with ridicule. 2. How to make your children distrust you.—Tell them untruths, and break your word with them. 3. How to make your children despise you.—Acquaint them with your faults. Lay many injunctions on them, without seeing whether they be obeyed; threaten them often, without executing your threats; and they will soon laugh at you. 4. How to make your children soon hate and envy each other.—Bestow all your affection on one, and none on the rest. Praise one child when you punish another. Take no notice of the injuries your children do one another, and never examine into the occasions of their quarrels. 5. How to stifle in your children the sentiments of humanity.—Speak evil of people frequently in their presence. 6. How to teach children cruelty.—Instruct them early to take pleasure in the pains and sufferings of animals. 7. How to make your children revengeful.—When they are angry, give them something to vent their anger upon. When your child is hurt by any one, represent the mischief as very great, and never attribute any blame to him. 8. How to teach children envy.—Represent the happiness of other people as a misfortune to them. 9. How to make children malicious.—When once you have brought them to regret the happiness of others, they will soon take pleasure in their misfortunes. 10. How to make children afraid of certain animals.—Endeavour to persuade them, that they are venomous. 11. How to give children an aversion to people of different religious opinions from themselves.—Tell them, that God hates all who do not believe what they do. Set them a good example of this in your own practice. 12. How to make children insensible to the beauties of nature.—Reprove them when they notice any productions of nature, and call

off their attention by promising them other gratifications. 13. How to teach children to see spirits.—Tell them many stories of ghosts and apparitions. 14. How to make children afraid of thunder.—Always appear greatly alarmed as soon as you perceive a thunder cloud. 15. How to make children afraid of dying.—Represent death to them as the greatest of all evils. 16. How to teach children to hate religion.—Depict God to them as a being to be dreaded. Bring them to an acquaintance with religion, by means not pleasant to them. Inspire them with hatred and contempt for the teachers of religion. 17. How to render children capricious. Do every thing they desire. 18. How to instruct children to tell lies.—Excite them early to say what is not true. Laugh at, and reward their lies. Believe every thing they say. Punish them, when they confess the truth. Let your questions give them occasion to tell lies. 19. How to accustom your children early to slander.—Encourage them to speak evil of others. 20. How to make children unhappy and discontented in their stations.—Teach them to view every thing on its worst side. Speak to them highly of things they cannot obtain. 21. How to render children obstinate.—Pay no heed to their modest requests; but consent to whatever they demand with persevering importunity. 22. How to make children useless members of society, and joyless in themselves.—Force them to some employment for which they have neither capacity nor inclination. 23. How to render children lascivious.—Take care, that they always sleep two together. Let them lie very warm, do not suffer them to rise too early. In the choice of a tutor, consider his accomplishments more than his virtue and morals. Caress your wife before them. 24. How to make children voluptuous.—Indulge their appetites in every thing. Let them have plenty of money, without inquiring what

they do with it. Give them dainties, and in giving commend them highly. 25. How to make children gluttons.—Take care that their bellies are always well stuffed. 26. How to render your children weary of being good.—Notice not their endeavours to be good, and they will soon be weary of them. 27. How to make children stupid.—Give them a good box on the ear, every time they forget any thing. Give yourself up to drunkenness, and you will necessarily have stupid children. Make your children prematurely wise, and they will soon become stupid. 28. How to make your children unhandy.—See that they have every thing done for them. 29. How to teach children negligence.—Check early their love of order. 30. How to make children vain.—Instruct them soon in the great value of dress. Introduce them into company as early as possible. 31. How to give children an inclination for idleness.—Represent to them frequently the grievousness of work, and the pleasure of being idle. 32. How to make children covetous.—Instil into them, as soon as possible, high notions of the value of money. 33. How to render children deaf to good advice.—Be incessantly preaching to them their duties. 34. A couple of infalliable means of leading children into all kinds of vice.—Frequently practice before them those vices you wish them to adopt. Leave your children to themselves and the servants. 35. Universal means of depriving children of health and life.—Make them tender by keeping them extremely warm. Deprive them of fresh air. Accustom them to delicate and dainty food. Give them plenty of medicines. Let them have infirm and unhealthy nurses. 36. An excellent method to make children cripples.—Let them wear stays.'

POLITICAL ECONOMY.

Having observed in the second number of the Emporium of Arts, an invitation for communications upon the subject of political economy, I am induced to send you the result of some attention and enquiry. It is with diffidence opinions are presented differing from your own; with hopes however that the public may be benefited by your further elucidations. The object of this writer will be gained if these remarks should be the means of engaging abler pens: and it is worthy of exertion to approximate the truth, in a science so difficult to develope, that it may be considered in its infancy, its first principles being yet unsettled.

All wealth is derived from the natural productions of the earth, and labour: but as it is labour alone that accumulates a surplus, and even attracts and concentrates produce, without any original possession, labour is entitled to the first place, and industry may be considered the parent of wealth.

A large surplus produce, whether derived from domestic labour, or from capital employing foreign labour, gives a nation prosperity; accumulated and condensed it becomes wealth, which is disseminated through the country by a large consumption; and united, as it must be, with numerous, active and intelligent population, constitutes power.

Of the different opinions which have prevailed, as to the most profitable mode of employing national industry, the principal are embraced in the agricultural and commercial systems.

The agricultural system supposes the greatest advantage to be derived from the multiplication of the productions natural to any country; particularly such as contribute directly to human subsistence.

The commercial system supposes a benefit is derived from a balance of trade; or an excess of exports over imports.

Agriculture is necessary to subsistence; the employment of the surplus produce is matter of choice: and whenever more that is useful can be obtained by means of exchange, than can be produced at home, by the same labour and capital which is employed in effecting the exchange; then a portion of the inhabitants may be more profitably engaged in foreign commerce than in domestic employments. And this must always be the case so long as a considerable diversity of circumstances exists among nations. A country possessing favourable soil and climate, valuable productions, and numerous population, with arts highly improved, may dispense with foreign commerce; may enjoy more prosperity without it, than other nations may be able to attain with its assistance: but as no nation can possess every advantage, in as great degree as all other nations, a judicious exchange of commodities will always be productive of profit; enriching those individuals whose capitals and services are employed, and rendering them instrumental in diffusing general prosperity.

It is stated that foreign commerce, by a diversion of capital and labour, withholds the means of domestic improvement. In extensive countries certain portions will possess facilities for foreign commerce superior to other portions; and as commercial adventurers seek only the best markets, it may often happen that the commercial districts purchase supplies abroad, which might be furnished, perhaps on terms nearly as favourable, by some other district at home, which thus loses the benefit of the supply. But a limitation of supply to home production would be to establish a system of monopoly, which must always be considered inequitable, except when granted as

a reward for public services, or resorted to as a measure of necessity for the public welfare. That such supplies cannot be obtained upon terms equally favourable at home, is proved by their being sought abroad; as no one encounters the hazard of foreign commerce, but for the sake of the profit which attends it. If commercial districts should be obliged to purchase such supplies at home, it must be at an advanced price. The direct public benefit would be the same, with a different division of the profit. The commercial districts would lose, and the supplying districts would gain. And it may well be questioned, whether domestic industry is entitled to greater advantage over foreign competition, at the expence of mercantile labour and capital, and against the domestic consumer, than at all times exists by means of the duties upon imports, which it is the concern of a wise government judiciously to regulate. Were it the case that supplies derived from foreigners, might be furnished by labor and capital otherwise unemployed, a monopoly might well be contended for; but the greatest effect that can be produced, among an enlightened and industrious people, is a change of employment, by the prosecution of business more or less profitable.*

There is, perhaps, no difficulty in discovering the advantages of commerce to individuals, and even to particular districts: it is in estimating its *national* bearings, that obscurity is found to exist. Arguments drawn from a balance of trade, even if official values could be fully relied upon, appear to be altogether fallacious; the amount of freight and expences being unknown.

* The duty on imports may furnish, in some measure, an indemnification to supplying and manufacturing districts, for any disadvantage they may suffer, from a preference granted to the shipping of maritime districts over foreign vessels.

May not the national advantage of foreign commerce be traced in the following manner?

Some nations possess an abundance of rude produce; others, flourishing manufactures; the interchange of these by commerce, appropriates to the commercial nation the peculiar advantages of every other; and *raises the whole value of its labour*, by sale of manufactured articles, to nations abounding in rude produce, and where skilful labour is dear—or of rude produce to nations possessing improved manufactures and numerous population, and where rude produce is consequently dear. This interchange of labour between nations, is similar in its effects to the division of labour among individuals, to which the most powerful effects have been justly attributed; or it may be considered as a division of labour upon a large scale; giving the highest stimulus to industry, both by introducing new articles of convenience, and extending the markets for home products; and realizing, without loss to the nation, a profit to the capital employed in foreign commerce, upon the whole of the foreign labour engaged in furnishing the articles of trade; which operates like an accession of population and territory.*

* These hints might be extended, shewing the increase of value of the whole national stock; the direction given to labour and production, spreading wealth over the country, and adopting the advantages of other nations as fast as they can be realized at home; it is through the channel of capital, wealth must flow; land is limited by nature, and labour must be fed, but capital may always make terms and embrace opportunities,—by which labour is gradually reduced to the standard of subsistence. The basis of capital is labour, whether employed in refined manufactures, or in bringing forward natural productions, according to circumstances of situation, soil, climate, abundance or cheapness of land, &c. Where great diversity exists among foreign nations, between whom trade is free, commercial capital flows into what is called carrying trade, which is perhaps only effecting two exchanges at one operation. It is, however, only proposed to call attention, and leave the subject for the readers reflection.

It appears reasonable in this view, that foreign commerce should give greater profit than domestic pursuits; and that commerce is the most profitable occupation, might be inferred from the avidity with which it has always been followed where circumstances favoured it, as well as by the great wealth accumulated by commercial nations.

Foreign commerce, thus advantageous to individuals and the nation, is also beneficial to the world; its direct tendency being to ameliorate human condition. It also adds to the splendor and strengthens the arm of government, by the concentration of wealth in a tangible form, passing frequently under the eyes and hands of its officers, furnishing the means of extensive indirect taxation; a species of contribution of all others the most freely paid, as it is in a great measure concealed from the labourer and consumer, and furnishes a benefit to the capitalist who advances or collects it. A consideration of this circumstance may anticipate an objection which might be made, that the direct wages of labour, are not always high in commercial countries.

It is, perhaps, to be numbered among the disadvantages of commerce, that the power conferred by it, is attended frequently, perhaps inevitably, with abuse. Wars between distant nations can scarcely arise but by means of commerce. It occasions the loss of many lives, both by the dangers of the ocean, and exposure in unhealthy climates. If it acquires wealth rapidly, it also introduces luxury and vice.

Such appear to be the advantages and disadvantages of commerce. It is more productive of wealth than any other employment: and, like most benefits, it is acquired with considerable dangers and sacrifices. Its inherent energy is so powerful, that it can seldom require encouragement; although, in the present state of the world, it

may want protection, and the adoption of measures to prevent inconvenient interference of foreigners; while the watchful care of government may be needful, to see that labour and capital are not entirely diverted from those objects of necessary supply and public security, which the welfare of the community may imperiously demand.

As the subject of public finances forms an important branch of political economy, these observations will be finished with remarking, that the employment of public credit, for useful purposes, in a young and growing country, if within the bounds of its capacity to repay, may be judicious; like the loans to young industrious traders; while the accumulation of debt by a nation, for unprofitable purposes, can only be attended with the wider mischief, the further and longer it is extended; for no modifications or changes of debt, by means of any combination or institution, will furnish any real or permanent relief, except provision is made by a surplus revenue; although by taking up floating paper, a sinking fund, so called, may enhance the market value of stock, and thus extend the power of government. M.

Massachusetts.

I make no remark on the above, because I do not want now to prolong this discussion. Having inserted Dr. Bollman's essay, and the above paper, it must suffice for the present. Hereafter perhaps I may insert my abridgment of *Ganilh*, with notes, and then close the subject. T. C.

STATISTICS.

I have collected some tables that relate to the statistical facts of Great Britain, France, and the United States: some more, some less common; all of them important to persons who know what use to make of tables of this kind. They are not complete, nor do I know how to make them so; but incomplete as they are, I have had great trouble in collecting them; and thus collected they will be more useful in the neighbourhood of each other, than scattered among many publications of partial circulation. Facts of this kind, furnish the only grounds of legitimate argument on questions of statistics and political economy. Hereafter, either I or some other person will be induced to add gradually to this collection, other recent statements as opportunities arise, and thus supply the foundations for reasoning on the causes that influence variations in the facts at different periods.

The facts that influence, or that demonstrate the national prosperity or otherwise of the European powers, are greatly interesting to ourselves. We can only reason from what we know; and we may be the wiser if we please, for the experience of others, as well as our own.

Great Britain and France, are now pursuing very different policies, and all the facts that give us an insight into the sources of their success or their failure, cannot but be of great moment to those, who will take the pains of comparing and reflecting. T. C.

The Epochs.			*The Ships cleared Outwards.*		
			Tons English.	Tons Foreign.	Total.
The Restoration		1663 1669	95,266	47,634	142,900
The Revolution		1688	190,533	95,267	285,800
The Peace of Ryswick		1697	144,264	100,524	244,788
The last years of William III.		1700 1 2	273,693	43,635	317,328
The Wars of Anne		1709	243,693	45,625	289,318
		1712	326,620	29,115	355,735
The first of George I.		1713 14 15	421,431	26,573	448,004
The first of George II.		1726 27 28	432,832	23,651	456,483
The peaceful years		1736 37 38	476,941	26,627	503,568
The War of		1739 40 41	384,191	87,260	471,451
The peaceful years		1749 50 51	609,798	51,386	661,184
The War of		1755 56 57	451,254	73,456	524,710
The first of Geo. III.	WAR:	1760	471,241	102,737	573,978
		61	508,220	117,835	626,055
		62	480,444	120,126	600,570
	PEACE:	1763	561,724	87,293	649,017
		64	583,934	74,800	658,734
		65	651,402	67,855	719,257
		66	684,281	61,753	746,034
		67	645,835	63,206	709,041
		68	668,786	72,734	741,520
		69	709,855	63,020	772,875
		70	703,495	57,476	760,971
		71	773,390	63,532	836,922
		72	818,108	72,603	890,711
		73	771,483	54,820	826,303
		74	798,240	65,273	863,513

The Epochs.		*The Ships cleared outwards.*		
		Tons English.	Tons Foreign.	Total.
WAR:	1775	783,226	64,860	848,086
	76	778,878	72,188	851,066
	77	736,234	83,468	819,702
	78	657,238	98,113	755,351
	79	590,911	139,124	730,035
	80	619,462	134,515	753,977
	81	547,953	163,410	711,363
	82	552,851	208,511	761,362
	83	795,669	157,969	953,638
PEACE:	1784	846,355	113,064	959,419
	85	951,855	103,398	1,055,253
	86	982,132	116,771	1,098,903
	87	1,104,711	132,243	1,236,954
	88	1,243,206	121,932	1,365,138
	89	1,343,800	99,858	1,443,658
	90	1,260,828	144,132	1,404,960
	91	1,333,106	178,051	1,511,157
	92	1,396,003	169,151	1,565,154
WAR:	1793	1,101,326	180,121	1,281,447
	94	1,247,398	209,679	1,457,077
	95	1,030,058	370,238	1,400,296
	96	1,108,258	454,847	1,563,105
	97	971,596	379,775	1,351,371
	98	1,163,534	345,132	1,508,666
	99	1,145,314	390,612	1,535,926
	1800	1,269,329	654,713	1,924,042
	1	1,190,557	767,816	1,958,373
PEACE:	1802	1,459,689	435,427	1,895,116
WAR:	1803	1,245,560	543,208	1,788,768
	4	1,248,796	553,267	1,802,063
	5	1,284,691	572,961	1,857,652
	6	1,258,903	538,700	1,897,603
	7	1,190,232	600,840	1,791,072
	8	1,153,488	272,104	1,425,592
	9	1,318,508	674,680	1,993,188

The Epochs.			*The Value of Cargoes exported.*		
			English.	Scots.	Total.
The Restoration		1663 1669	£.2,043,043	. . . . .	£.2,043,043
The Revolution		1688	4,086,087	. . . . .	4,086,087
The Peace of Ryswick		1697	3,525,907	. . . . .	3,525,907
The last years of William III.		1700 1 2	6,045,432	. . . . .	6,045,432
The Wars of Anne		1709 1712	5,913,357 6,868,840	. . . . .	5,913,357 6,868,840
The first of George I.		1713 14 15	7,696,573	. . . . .	7,696,573
The first of George II.		1726 27 28	7,891,739	. . . . .	7,891,739
The peaceful years		1736 37 38	9,993,232	. . . . .	9,993,232
The War of		1739 40 41	8,870,499	. . . . .	8,870,499
The peaceful years		1749 50 51	12,599,112	. . . . .	12,599,112
The War of		1755 56 57	11,708,515	663,401	12,371,916
The first of Geo. III.	WAR:	1760	14,694,970	1,086,205	15,781,175
		61	14,873,191	1,165,722	16,038,913
		62	13,545,171	998,165	14,543,336
	PEACE:	1763	14,487,507	1,091,436	15,578,943
		64	16,512,404	1,243,927	17,756,331
		65	14,550,507	1,180,867	15,731,374
		66	14,024,964	1,163,704	15,188,668
		67	13,844,511	1,245,490	15,090,001
		68	15,117,983	1,502,150	16,620,133
		69	13,438,236	1,563,053	15,001,289
		70	14,266,654	1,729,915	15,996,569
		71	17,161,147	1,857,334	19,018,481
		72	16,159,413	1,560,756	17,720,169
		73	14,763,253	1,612,175	16,375,428
		74	15,916,344	1,372,143	17,288,487

The Epochs.		*The Value of Cargoes Exported.*		
		English.	Scots.	Total.
WAR:	1775	£15,202,366	1,123,998	£16,326,364
	76	13,729,726	1,025,973	14,755,699
	77	12,653,363	837,643	13,491,006
	78	11,551,070	702,820	12,253,890
	79	12,693,430	837,273	13,530,703
	80	11,622,333	1,002,039	12,624,372
	81	10,569,187	763,109	11,332,296
	82	12,355,750	653,709	13,009,459
	83	13,851,671	829,824	14,681,495
PEACE:	1784	14,171,375	929,900	15,101,275
	85	15,762,593	1,007,635	16,770,228
	86	15,385,987	914,738	16,300,725
	87	17,181,032	1,115,134	18,296,166
	88	16,934,994	1,189,088	18,124,082
	89	18,843,221	1,170,076	20,013,297
	90	18,884,716	1,235,404	20,120,120
	91	21,435,459	1,296,535	22,731,994
	92	23,674,316	1,230,884	24,905,200
WAR:	1793	19,365,428	1,024,751	20,390,180
	94	25,663,272	1,084,811	26,748,083
	95	26,146,346	976,991	27,123,338
	96	39,196,190	1,322,723	30,518,913
	97	27,699,889	1,217,121	28,917,010
	98	31,922,580	1,669,197	33,591,777
	99	34,074,698	1,916,630	35,991,329
	1800	40,805,947	2,346,069	43,152,019
	1	39,256,330	2,844,502	42,100,832
PEACE:	1802	43,518,104	2,602,858	46,120,962
WAR:	1803	29,385,273	2,053,222	31,438,495
	4	32,199,058	2,252,319	34,451,377
	5	32,404,978	2,504,867	34,909,845
	6	33,810,570	2,716,614	36,527,184
	7	31,829,733	2,736,838	34,566,571
	8	31,737,925	2,816,342	34,554,267
	9	45,918,663	4,383,100	50,301,763

The Epochs.			*The Balance of Trade.*		
			English.	Scots.	Total.
The Restoration		1663, 1669	Unfavorable.	.....	.....
The Revolution		1688	Doubtful.	.....	.....
The Peace of Ryswick		1697	£ 43,320	.....	£ 43,320
The last years of William III.		1700, 1, 2	1,386,832	.....	1,386,832
The Wars of Anne		1709	2,116,451	.....	2,116,451
		1712	3,014,175	.....	3,014,175
The first of George I.		1713, 14, 15	1,904,151	.....	1,904,151
The first of George II.		1726, 27, 28	3,514,768	.....	3,514,768
The peaceful years		1736, 37, 38	4,642,502	.....	4,642,502
The War of		1739, 40, 41	2,455,313	.....	2,455,313
The peaceful years		1749, 50, 51	6,521,964	.....	6,521,964
The War of		1755, 56, 57	4,046,465	.....	4,046,465
The first of Geo. III.	WAR:	1760	5,746,270	235,412	5,981,682
		61	6,822,051	417,082	7,239,133
		62	5,263,858	289,240	5,553,098
	PEACE:	1763	4,495,146	187,545	4,682,691
		64	6,148,096	357,575	6,505,671
		65	3,660,764	258,466	3,919,230
		66	2,549,189	182,715	2,731,904
		67	1,770,555	222,293	1,992,848
		68	3,239,322	265,501	3,504,823
		69	1,529,676	337,523	1,867,199
		70	2,049,716	514,556	2,564,272
		71	4,339,151	471,005	4,810,156
		72	2,860,961	350,492	3,211,453
		73	3,356,412	496,376	3,852,788
		74	2,888,678	169,866	3,058,544

The Epochs.		*The Balance of Trade.*		
		English.	Scots.	Total.
WAR:	1775	£2,275,003	. . . . .	£2,275,003
	76	2,962,424	279,292	3,241,716
	77	1,472,996	35,389	1,508,385
	78	1,379,653	. . . . .	1,379,653
	79	2,092,133	62,501	2,154,634
	80	1,688,494	99,315	1,787,809
	81	. . . . .	. . . . .	. . . . .
	82	2,823,143	. . . . .	2,823,143
	83	1,737,027	. . . . .	1,737,027
PEACE:	1784	52,209	. . . . .	52,209
	85	862,650	. . . . .	862,650
	86	775,824	. . . . .	775,824
	87	845,935	. . . . .	845,935
	88	383,939	. . . . .	383,939
	89	2,435,082	. . . . .	2,435,082
	90	1,442,267	. . . . .	1,442,267
	91	3,747,307	. . . . .	3,747,307
	92	5,776,615	. . . . .	5,776,615
WAR:	1793	1,542,154	. . . . .	1,542,154
	94	4,818,273	. . . . .	4,818,273
	95	4,677,977	. . . . .	4,677,977
	96	7,733,480	. . . . .	7,333,480
	97	8,179,016	. . . . .	8,179,016
	98	5,968,419	. . . . .	5,968,419
	99	9,590,856	. . . . .	9,590,856
	1800	12,448,135	133,278	12,581,413
	1	11,885,220	264,558	12,149,778
PEACE:	1802	17,961,243	. . . . .	17,961,243
WAR:	1803	3,890,541	. . . . .	3,890,541
	4	5,609,510	. . . . .	5,609,510
	5	5,071,328	. . . . .	5,071,328
	6	8,008,627	. . . . .	8,008,627
	7	6,014,233	. . . . .	6,014,233
	8	4,261,256	653,659	4,914,915
	9	15,412,586	1,119,081	19,895,203

The Epochs.			*The net customs paid into the exchequer.*	*The Money Coined.*
The Restoration		1663 1669	£ 390,000	By C. II. *l.*7,524,105 By Js. II. 2,737,637
The Revolution		1688	551,141	*l.*10,261,742
The Peace of Ryswick		1697	694,892	by W. III. *l.*10,511,963
The last years of William III.		1700 1 2	1,474,861	
The Wars of Anne		1709 1712	1,257,332 1,315,423	by Anne *l.*2,691,626
The first of George I.		1713 14 15	1,588,162	by Geo. I. *l.*8,725,921
The first of George II.		1726 27 28	1,621,731	
The peaceful years		1736 37 38	1,492,009	
The War of		1739 40 41	1,399,865	by George II. Gold *l.*11,662,216 Silver 304,360 *l.*11,966,576
The peaceful years		1749 50 51	1,565,942	
The War of		1755 56 57	1,763,314	
The first of Geo. III.	WAR:	1760	1,969,934	The great re-coinage of Gold between the 23d of August 1773, and the end of 1777, amounted to *l.*20-447,002: From the commencement of the reign to August 1773, there were coined, about *l.*10,-000,000: So that, there were coined,
		61	1,866,152	
		62	1,858,417	
	PEACE:	1763	2,249,604	
		64	2,169,473	
		65	2,271,231	
		66	2,448,280	
		67	2,355,850	
		68	2,445,016	
		69	2,639,086	
		70	2,546,144	by Geo. III. before the 31st of Dec. 1780,
		71	2,642,129	Of Gold *l.*30,457,805
		72	2,525,596	Silver 7,126
		73	2,439,017	*l.*30,464,931
		74	2,567,770	

The Epochs.		*The net customs paid into the exchequer.*	*The Money Coined.*		
			Gold.	*Silver.*	
WAR:	1775	£2,481,031			
	76	2,480,403			
	77	2,229,106			
	78	2,162,681			
	79	2,502,274			
	80	2,723,920			
	81	2,791,428	£876,794	£62	
	82	2,861,563	698,074		
	83	2,848,320	227,083		
PEACE:	1784	3,326,639	822,126	202	
	85	4,592,091	2,488,106		
	86	4,076,911	1,107,382		
	87	3,673,807	2,849,056	55,459	
	88	3,780,770	3,664,174		
	89	3,710,343	1,530,711		
	90	3,782,822	2,660,521		
	91	3,952,507	2,456,566		
	92	4,027,230	1,171,863	252	33,367,305
WAR:	1793	3,978,645	2,747,430		
	94	3,565,117	2,558,894		
	95	3,569,360	493,416	293	
	96	3,651,757	464,680		
	97	4,111,105	2,000,297		
	98	5,599,087	2,967,504		
	99	7,538,355	449,961		
	1800	6,799,755	189,936	90	
	1	5,895,711	450,240	53	
PEACE:	1802	6,087,569	437,018	62	
WAR:	1803	7,179,621	596,445	The silver coinage was prohibited.	2,445,253
	4	8,357,871	718,396		
	5	9,084,459	54,615		
	6	9,733,814	405,105		
	7	9,207,735			
	8	8,797,823	371,744		
	9	10,289,807	298,946		
The total of the present reign					£.66,277,489.

The preceding table was first published by Mr. George Chalmers, in his 'comparative strength of the British empire,' p. 207, which extended to 1784. The subsequent years have been filled up from the later panegyrists of the British commercial system, Rose, M'Arthur, Brinsted, and the common periodical publications of the day. M'Arthur supplies the facts to 1800. The books are before me, but I take the table, to save time, from Walsh's Review, vol. 1. The exports and imports of some of the subsequent years, will be found among the other tables I shall present to the reader.

The above statements are the values of exported goods as officially delivered in, on entry, by the exporting merchant. But a custom-house entry has long been a proverbial expression. It has been the great aim of the British ministers since the American war, which ended in 1783, to swell as much as they can, the apparent amount of the commerce of the country. Hence for about fifteen or twenty years past, Mr. Irving the Inspector-general of the Customs, has discovered that the value of the goods exported, was upwards of one third more than the entered value upon which the duties and drawbacks were calculated. As to the inference with respect to the exporting merchant, no one thinks of it or regards it. The calculations of Mr. Irving, are made, I believe from a comparison of Custom-house entries, with the actual amount of East India sales, and with the Convoy duty; and are to a considerable degree well founded; but whether to the extent he reports, I know not, as I do not possess the necessary documents to ascertain the fact. The practice is certainly a very inexpedient one; for it throws great uncertainty on the value of the custom-house documents, and it not only opens a door to double invoices for different purposes, but almost renders them necessary.

The three following tables will illustrate this difference of supposed actual value, from the value declared at the custom-house. The first I copy from Mr. Irving's return of April 4, 1803, the second from his return to the house of commons, on May 16, 1811, ordered to be printed 18 Feb. 1812. The third table is from the Monthly Magazine of July 1812, p. 593.

TABLE FIRST.

An account of the value of all Imports into Great Britain for eighteen years, ending January 5, 1803; exclusive of corn and other grain, and exclusive of importation, from the East Indies and China: together with the difference between the official value and the declared value of British produce and manufactures exported, for as many years of the same period as such an account can be made up.

	Imports, exclusive of corn and other grain, and exclusive of importations from the East and West Indies.			British produce and manufactures exported.			
Y's.	Official value.			Official value.			Real or declared value.
	£	s	d	£	s	d	£
1785	12,939,536	16	10	11,081,810	16	5	
1786	12,053,839	13	5	11,830,372	18	11	
1787	12,761,245	10	5	12,053,900	3	5	
1788	13,807,708	8	9	12,724,719	17	9	
1789	13,879,465	9	11	13,779,506	2	6	
1790	14,924,222	15	8	14,921,054	9	7	
1791	14,463,725	18	11	16,810,018	16	4	
1792	16,005,657	18	7	18,336,851	6	11	
1793	14,165,443	1	4	13,892,268	17	7	
1794	16,482,673	10	11	16,725,192	16	2	
1795	19,010,433	8	0	16,338,213	2	2	
1796	17,441,036	19	10	17,102,220	3	11	
1797	15,803,883	7	8	16,903,103	6	1	
1798	18,862,188	13	7	19,672,503	0	9	33,148,692
1799	21,386,240	17	10	24,584,213	0	10	38,942,498
1800	22,720,664	11	8	24,304,283	13	6	39,471,203
1801	24,145,500	12	0	25,699,809	6	1	41,770,344
1802	24,436,481	14	11	27,012,108	3	10	48,500,683
1803	———	—	—	———	—	—	———
1804	———	—	—	———	—	—	———

TABLE SECOND.

British		Official value.	Real value.
Imports in	1805	30,344,628	63,582,146
	1806	28,835,907	50,621,707
	1807	2 ,854,658	53,500,990
	1808	29,629,353	55,718,698
	1809	33,772,409	59,851,352
	1810	41,136,135	74,538,061

		Official value.	Real value.	Customs received.
exports in	1805	34,308,545	51,109,131	
	1806	36,527,184	53,028,881	9,456,255
	1807	34,566,572	50,482,661	9,573,060
	1808	34,554,267	49,969,746	9,214,131
	1809	50,286,900	66,017,712	10,532,989
	1810	45,869,860	62,702,409	10,773,869

Annual Register, 1809, *page* 345.

I have no means of filling up this table to the present time: excepting as to the year 1811, when the real value of the exports amounted to about 44 millions as appears by the following table. From the preceding, it should seem, that if we add to the *official* value about one half its amount, we shall approximate to what is considered as the *real* value of goods exported.

TABLE III.

An Account of the real value of Exports from Great Britain in the years 1805, 1806, 1807, 1808, 1809, 1810, and 1811, respectively—distinguishing generally the countries to which the goods were exported.

YEARS.	Continent of Europe.	Ireland and Isles Guernsey, Jersey and Man.	ASIA.	AFRICA.	United States of America.	Other parts of America and the W. Indies.	TOTAL.
	pounds.	*pounds.*	*pounds.*	*pounds.*	*pounds.*	*pounds.*	*pounds.*
1805, ...	20,435,940	6,400,363	3,111,748	1,136,955	11,446,939	8,557,186	51,109,131
1806, ...	17,547,243	5,813,650	3,259,834	1,655,042	12,865,551	11,887,501	53,028,881
1807, ...	15,420,514	7,032,272	3,555,392	1,022,745	12,007,942	11,353,796	50,482,661
1808, ...	13,983,123	7,971,694	3,718,813	820,194	5,302,863	18,173,056	49,969,746
1809, ...	27,190,337	7,565,599	2,990,440	976,872	7,460,768	19,833,696	66,017,712
1810, ...	24,224,567	5,765,464	3,117,075	693,911	11,217,683	17,683,707	62,702,409
1811, ...	18,537,204	7,210,699	3,063,971	409,075	1,874,917	12,843,754	43,939,620
Annual average of 3 ys. ending with 1807,	17,801,232	6,415,428	3,308,991	1,278,248	12,136,811	10,599,514	51,540,224
Ann. average of 4 years ending with 1811,	20,983,808	7,128,364	3,222,575	725,013	6,464,059	17,133,553	55,657,372

Custom-House,
London, 28*th April*, 1812.

WILLIAM IRVING, Inspector-General of Imports and Exports.

Month. Mag. for July 1812, *p.* 593.

It will be observed that there are differences in the amounts of these tables, from each other, and from that which Walsh has given from the authors, I have cited. I do not know how to account for the differences, but I regard Mr. Irving's statements as entitled to superior credit.

Since the American peace of 1783, it has been the fashion of all the ministers of Great Britain, from Pitt to Percival, at the annual opening of the budget, to dwell with almost exclusive interest on the state of the commerce of the country, on the vast and increasing amount of exports and imports, and the balance of trade. This seems to have arisen not merely from what I conceive false views of the relative importance of foreign commerce, but also from the necessity of conciliating the prejudices of the monied interest. This bias in favour of commercial statements appears to me to have been carried by Mr. Pitt, and Mr. Percival particularly, to a morbid excess. Even during the periods of war, the wonderful encrease of British commerce has been the theme of ministerial exultation; but the minister never thought fit to enter into any analysis of the items. It seemed as if the most effectual method ever discovered of encreasing the trade of the country, was to go to war with all the world, and contrive that no market whatever should be open to British goods. The success of these legerdemain calculations, was truly astonishing. The minister borrowed for instance twenty millions sterling: he laid out the greatest part of it, in cloathing, arms, provisions, &c. &c. for the use of the navy and army. The merchants and manufactures among whom this money was expended, entered the goods in the usual course for exportation, and all the other exports on account of government, were also entered at the custom house; these entries, swelling the bulk of export, are gravely used as evidences of the great encrease of foreign trade! We cannot therefore, if this account of the matter be true, as I believe it to be, consider the gross statements of export and import of that country, as furnishing any accurate knowledge of the real state of foreign trade. I shall be glad to receive any *authentic* refutation of this view of the subject, if any person knowing otherwise, will furnish *the facts:* but I know this has been, and I believe it continues to be the case.

OF THE TONNAGE OF GREAT BRITAIN.

British Navy. The following extract of a letter, addressed to Mr. Percival by lord Melville, on the subject of the establishment of a naval arsenal at North fleet, presents within a small com-

pass a striking view of the progressive increase of the British navy:

"The following short statement will remind you of the establishment of the different royal dock yards now existing in the kingdom. They are six in number, Deptford, Woolwich, Chatham, Sheerness, Portsmouth and Plymouth.

"Deptford was built in the reign of Henry the VIII. under whose sway, history tells us, this country possessed the first fleet composed of ships of war, belonging to the king: although I have heard that some archives, recently discovered in the tower, prove the existence of a fleet of that kind in the reign of the preceding monarch, Henry VII.

"Woolwich yard was formed under the auspices of the same monarch.

"Chatham was founded by queen Elizabeth, where the gun-wharf now is, and where there was only one small dock: but that being too confined a spot, it was removed about the year 1622 to its present situation.

"Sheerness was formed in the reign of Charles II.

"Portsmouth by Henry VIII. being the third dock yard founded by him.

"Plymouth by William III. about the year 1694, and in 1698 money was voted by the house of commons for completing it.

"The progressive advance of our navy, will appear by attending to the following recital of its tonnage at different periods, from the reign of Henry VIII. to the present time.

	Year	*Tons about.*
At the death of Henry VIII	1547	12,400
Edward VI	1553	11,000
Mary	1558	7,000
Elizabeth	1603	17,100
James I	1625	19,400
Rebellion	1641	22,400
Charles I	1649	uncertain
At the restoration	1660	57,460
Death of Charles II	1685	103,558
Abdication of James II	1688	101,900
Death of William III	1702	159,000
Anne	1614	167,170
George I	1727	170,860
George II	1769	321,200
On the 31st December, 1788		4 3,660
- - - - - - - - - 1806		776,000
- - - - - - - - - 1809		800,000

"Thus it appears, that notwithstanding the vast increase of our navy not a single dock yard has been added to it since the reign of William III. about a hundred and nineteen years ago, at which time the tonnage of the naval force of this kingdom amounted to near 160,000 tons: it is now near 800,900 tons, or about five times as large."

The following statement is the amount and disposition of the British navy up to January 1, 1812. At sea, 115 of the line; 8 from 44 to 50; 126 frigates; 97 sloops; 5 bombs; 121 brigs; 32 cutters; 52 schooners—total 527. In port and fitting, 32 of the line; 8 from 44 to 50; 28 frigates; 38 sloops; 1 bomb; 29 brigs; 6 cutters; 21 schooners—total 162. Guard ships, 4 of the line; 1 fifty; 4 frigates; 5 sloops—total 14. Hospital ships, &c. 31 of the line; 3 of 50; 3 frigates—total 37. Total in commission, 187 of the line; 20 from 44 to 50; 161 frigates; 140 sloops; 6 bombs; 150 brigs; 37 cutters; 73 schooners——total 740. Ordinary and repairing for service, 70 of the line; 14 from 44 to 50; 59 frigates; 38 sloops; 6 bombs; 13 brigs; 2 schooners—total 202. Building, 31 of the line; 2 of fifty; 14 frigates; 5 sloops—total 52, forming the grand total of 994 British vessels of war.

Comparative strength of the different Naval Powers, 1813.

British Naval Force.—At sea, 79 ships of the line: nine from 50 to 44 guns—122 frigates—77 sloops and yachts—4 bombs, &c.— 161 brigs—54 cutters—52 schooners, &c.———In port and fitting, 30 of the line—11 from 50 to 44 guns—29 frigates—18 sloops—4 bombs, &c.—86 brigs—6 cutters—11 schooners, &c. ——Hospital ships, prison ships, &c. 28 of the line—2 from 50 to 44—2 frigates—1 yacht——Ordinary and repairing for service, 77 of the line—10 from 50 to 44 guns—70 frigates—37 sloops—3 bombs—11 brigs—1 cutter—2 schooners.——Building, 29 of the line—4 from 50 to 44 guns—12 frigates—5 sloops, &c.—3 brigs——Making a grand total of 1545 vessels.

Russian Navy.—53 sail of the line—34 frigates—59 cutters, brigs, &c.—smaller vessels, 226, carrying in all 4,428 pieces of cannon.—In this estimate are included ships of every class and condition, from a first-rate to a gun-brig; those that are building, under repair, and laid up in ordinary as unserviceable, as well as those that are in commission, and fit for immediate service.

Swedish Navy.—The Swedish fleet consists of 12 sail of the line, eight frigates, besides cutters, gun boats, &c. and there are two ships of the line and three frigates building.

Portuguese Navy.—The Portuguese have eight sail of the line, three frigates, and four sloops, at the Brazils—At Lisbon there are some ships of war, but they are chiefly unfit for service.

Danish Navy.—The present naval force of Denmark consists of four ships of the line, two frigates, and about 120 gun-boats. There are two ships of the line and three frigates on the stocks. Their maritime operations are chiefly carried on by flotillas of gun brigs, which carry heavy metal, are well manned, manœuvred, and fought; and, in a calm, are formidable even to ships of war.

United States Navy.—The republican navy, at present, consists of the following frigates:—Constitution, 44, Captain Hull; United States, 44, Captain Decatur; President, 44, Commodore Rogers; Chesapeake, 36; New-York, 36; Constellation, 36; Captain Bainbridge; Congress, 36, Captain Smith; Boston 32; Essex, 32, Captain Porter; Macedonian, (late British,) 38; the John Adams corvette: Hornet sloop, of 16 guns; Syren, Argus, and Oneida brigs, of 16 guns; Vixen, Enterprize, and Viper schooners, of 12 guns; 170 gun boats, stationed at New Orleans: and the Vengeance, Ætna, Vesuvius, and Spitfire bombs.

French Navy.—In the various ports of France, Holland, and Italy, the French have 65 sail of the line, and 61 frigates, ready for sea; and 32 sail of the line, and 26 frigates, building and fitting out; so that in a short time we shall have opposed to us, under French colours, a numerical force of 97 sail of the line, and 87 frigates: but even the ships which are pretended to be ready for a start, particularly those in the Scheldt, are very badly manned; an evil for which the enemy does not possess any practicable remedy.

13th January, 1813.

VESSELS OF WAR.

A general view of the dimensions of the most approved ships of each class in the British navy. Prepared from authentic papers, for the Register. (Niles.)

NOTE.—Fractions omitted. When more than a half, added, when less than a half, unnoticed.

DIMENSIONS OF SHIPS AND THEIR APPURTENANCES.	Of 100 guns.	Of 90 guns.	Of 74 guns.	Of 64 guns.	Of 50 guns.	Of 44 guns.	Of 32 guns.	Of 28 guns	Of 20 guns.	Of 14 guns.
Length of the gun deck *feet*	186	177	169	158	146	140	126	118	108	96
Do. of the keel for tonnage do	151	146	138	129	119	115	103	97	89	78
Extreme breadth - do	52	49	46	44	40	37	35	34	30	27
Depth in the waist - do	6	5*h*	6	6	5	5	5	5	5	4*h*
Do. in the hold - - do	21*h*	21	20	19	17*h*	16	12	10*h*	10	12
Burthen - - *in tons*	2162	1871	1620	1336	1045	879	690	586	429	300
Foremast—length - *yards*	34*h*	33*h*	32	30	27	26	25	24	21	19
thickness *inches*	34*h*	33*h*	32	30	27	23	22	21	19	17
Main-mast—length *yards*	39	37	36	33	31	29	28	27	24	21
thickness *inches*	39	37	36	33	29	26	24*h*	22	22	18
Mizen mast—length *yards*	34	33	31	29	26	25	24	20	18	17
thickness *inches*	23	22	21	20	18	17	16	16	14	12
Fore top mast———length *yards*	21	19	19	18	16	15	15	13	12	11
Main top mast do do	23	20	22	19	18	18	17	16	14	12
Mizen top mast do do	16	16	15	14	13	13	13	12	11	9
Fore top gallant mast do do	10	9	9	9	8	8	7	8	8	5
Main top gallant mast do do	11	11	11	10	9	9	8	9	8	6
Mizen top gallant mast do do	8	8	8	7	7	7	6	6	5	4
Bowsprit - - do do	24	24	23	20	18	17	17	17	15	13
thickness - - *inches*	37	36	34	31	28	26	25	23	23	18
Flying gib boom—length *yards*	17	17	16	15	13	13	12	12	11	9
Fore yard - do do	30	28	28	26	24	23	21	22	19	16
Main yard - do do	34	32	32	30	28	27	25	25	22	18
Mizen yard - do do	29	27	29	27	25	24	22	20	20	8
GUNS—gun deck - *no.*	30	28	28	26	22	20	26	24	20	14
Metal - *pounds*	42	32	38	24	24	18	12	9	9	6
Middle deck - *no.*	28	30								
Metal - *pounds*	24	18								
Upper deck - *no*	30	30	28	26	22	20				
Metal - *pounds*	12	12	18	18	12	9				
Quarter deck and forecastle *no.*	12	2	18	12	6	3	6	4		
Metal—weight *pounds*	6	9	9	9	6	6	6	3		

A 42 pounder is 9 feet 6 inches long, 6 1-2 in the bore, and weighs 65 *cwt.*
32 do 9 6 do 6 - - - 50
24 do 9 do 5 1-2 - - 48
18 do 9 do 5 - - - 39
12 do 9 do 4 1 2 - - - 34
9 do 7 6 do 4 - - - 25
6 do 6 do 3 1-2 - - - 16
3 do 4 6 do 3 - - - 6

☞ The foregoing table is formed and inserted for the purpose of giving a *general* idea of the dimensions and force of a ship, on hearing her *rate* mentioned in the newspapers. But their actual force in guns is commonly from a fourth to a third more than they are rated—and their weight of metal and many other particulars, differ widely from the rules of the admiralty, being governed by various *particular* circumstances, in the make or construction of the vessels.

A 74 gun ship is calculated in England to consume the timber of 50 acres of oak land. The *modern built* vessels of the British navy do not last, on an average, more than nine years, owing to the want of proper seasoning. Pine wood will not last more than six years. At present the English resort to the Teek-wood of the East Indies.

An account of the number of vessels, with the amount of their tonnage, and the number of men and boys employed in navigating the same, (including their repeated voyages) which entered inwards and cleared outwards, at the several ports of Great Britain, from and to all parts of the world, in the years 1806, 1807, 1808, 1809, 1810 and 1811—distinguishing British from foreign.

YEARS.		BRITISH.			FOREIGN.			IN ALL.		
		Ships.	Tons.	Men.	Ships	Tons.	Men.	Ships.	Tons.	Men.
Inwards.	1806	12,110	1,482,412	88,963	3,792	612,800	31,346	15,902	2,095,212	120,309
	1807	11,213	1,436,667	84,997	4,087	680,144	32,488	15,300	2,116,811	117,485
	1808	11,303	1,311,966	82,617	1,926	283,657	15,540	13,231	1,595,623	98,157
	1809	12,656	1,539,573	95,796	4,922	759,287	38,285	17,578	2,298,860	134,081
	1810	13,557	1,609,088	102,900	6,876	1,176,243	66,094	20,433	2,785,331	162,994
	1811	12,908	1,522,692	94,740	3,216	687,180	34,157	16,124	2,209,872	128,897
Outwards.	1806	12,239	1,485,725	94,513	3,457	567,988	29,616	15,696	2,053,713	124,129
	1807	11,428	1,424,103	89,720	3,846	631,910	31,411	15,274	2,056,013	121,131
	1808	11,917	1,372,261	89,671	1,892	282,145	15,671	13,809	1,654,406	105,272
	1809	12,499	1,531,152	102,523	4,530	699,750	37,256	17,029	2,230,902	139,779
	1810	13,090	1,624,120	107,713	6,641	1,138,527	60,870	19,731	2,762,647	168,583
	1811	12,774	1,507,333	96,739	3,350	696,232	37,262	16,124	2,203,585	134,001

J. E. WILLOUGHBY, Bec. General.

Custom-House,
London, 28th April, 1812.

It appears from some documents that I have mislaid, that in the fall of the year 1813, the number of British merchant vessels was near 23,000.

BRITISH STOCK OR FUNDS.

These are denominations of public debt, and the taxes appropriated by parliament to pay the interest of that public or national debt, and support the current expences of government; these have at different times been *funded*; that is, classed, arranged, and made permanent under different names, as temporary expedience required. Such as three per cents 1726: three per cents consol (consolidated annuities); three per cents reduced; three per cents deferred stock; three per cents south sea of 1751; three per cent. old south sea annuities; three per cent. new south sea annuities; three per cent. imperial annuities; four per cent. consols. Five per cent. navy annuities; five per cent. stock of 1797, and 1802; five per cent. Irish. Old annuities; long annuities; short annuities; Irish annuities; imperial annuity; south sea stock. The Bank stock, and India stock, India annuities, India bonds belong exclusively to those two chartered companies respectively.

Thus it appears that some of these funds, consist of annuities payable to the public creditor or stock holder, for ever: and others, of annuities that expire at certain periods.

When three per cent. consols, or any other three per cent. perpetual annuities can be purchased at 60; four per cents at 80; five per cents at 100; Bank stock yielding a dividend of seven per cent. at 140; India stock yielding 10½ dividend, at 210, then does the purchaser get five per cent. or legal interest, for his money. Whenever the three per cent. consols for instance, which is the largest stock in amount, fall below 60, the stock is manifestly depreciated by national circumstances. Indeed, when legal interest is at five per cent. three per cents ought to fetch 80, owing to the ease and certainty, with which the interest is receivable.

The funds existing in Sir R. Walpole's time, were then formed (1715, and 1716) into three general funds, the *aggregate* fund; the *south sea* fund and the *general* fund: to which in 1716 Sir Robert added the *sinking* fund, of which I shall speak separately. To these funds certain taxes were respectively annexed, the produce whereof was invariably to be applied to the payment of the interest of that fund, which thus formed a mortgage on the tax.

The following account from 1 *Niles's Reg.* 261, *is tolerably accurate.*

NATIONAL DEBT—EXPENDITURE—TAXATION.

National Debt.

When queen Anne came to the throne in 1701, the debt was	*l.*16,394,702
When George I. came to the throne in 1714	54,145,362
When George II. came to the throne in 1727	52,092,235
When George III. came to the throne in 1760	146,632,844
At the close of the American war the debt was (1784)	257,213,043
At the close of the war against "revolutionary France," (1801)	579,911,447
January 5, 1810	811,893,082

From a late debate in the British house of Lords, (1813), on a motion made by lord Lauderdale to enquire into the alarming state of the currency of that nation, we learn the following interesting facts, viz:

1. That three years ago, the war cost the British government 100 millions—next year, 104 millions—and last year, 112 millions sterling!

2. That, in the course of the present year, 50 millions have been added to the national debt.

3. That, in the year 1813, the bank of England bills, then in circulation, were only 12 millions; now, they amount to 43 millions.

4. That government, besides interest on the national debt, pays to the bank of England an *extra* interest of nearly two millions on their exchequer bills.

5. That in July last, an ounce of Portuguese gold, formerly 3l. 17s. 6d. now brings 5l. 5s. in bank paper. A silver dollar, formerly worth 4s. 6d. with the new stamp, now brings 6s. 9d.

6. That paper currency has depreciated 35 per cent.

7. That, some years ago, there were annually brought from New Spain between thirty and forty millions of dollars; now, only between seven and eight millions.

Funded and unfunded debts of Great Britain and Ireland on the 1*st of January*, 1813.

Great Britain - - -	*l* 812,013,135	8	11¾
Ireland - - -	94,926,454	7	8½
Total,	*l* 906,939,589	16	8¼

An account of the total amount of the capital of the unfunded debt of Great Britain and Ireland, up to the 5th of January, 1813.

Great Britain - - - - -	£54,055,632 17 11
Ireland - - - - -	2,342,215 18 11
	£56,397,848 16 10

An account of the total money raised in the year ending the 5th of January, 1813; specifying the sums raised by taxes and by loan.

RAISED BY TAXES.

GREAT BRITAIN.

Paid into the exchequer on account of every branch of public revenue or income (except lotteries, and the interest, &c. of the Irish debt)	£58,790,361, 7 4½
Ditto on account of lotteries - -	942,537 17 8
Payments in anticipation of exchequer receipts: drawbacks, discounts, charges of management, &c. paid out of gross revenue	6,025,148 9 0
Payments out of nett produce, applicable to national objects	1,036,597 2 5¼
Total,	£66,794,644 16 5¼

IRELAND.

Paid into the exchequer on account of every branch of public revenue or income (except the interest, &c. of the Irish debt.)	£4,779,857 13 9
Payments in anticipation of exchequer receipts: Drawbacks, discounts, charges of management, &c. paid out of gross revenue	1,006,701 1 9
Payments out of nett produce, applicable to tional objects	213,214, 14 10
Total,	£5,999,771 15 4

RAISED BY LOAN.

GREAT BRITAIN.

By increase of national debt—By loan	£29,268,586 16 8
Retained by the bank for receiving loans and lotteries	19,031 14 6

By exchequer bills funded	5,431,700	0	0
By increase of exchequer bills, outstanding	3,914,600	0	0
Total, *l*	38,633,918	10	8

IRELAND.

By increase of national debt—By loan	*l* 1,396,615	7	8
By increase of exchequer bills, outstanding	478,579	9	8
Total, *l*	1,875,194	17	4
Grand total, *l*	113,303,529	19	$9\frac{3}{4}$

RICHARD WHARTON

Whitehall Treasury Chambers,
April 14, 1813.

As the greater part of the debt bears only *three per cent. per annum*, and *l* 100 of its *stock* will produce no more than from 60 to *l* 65 in *money*, the British financial writers estimate its *real* amount to be about 500 millions, *because it might be purchased for that sum in cash.*

The following facts will explain to the reader why such great quantities of stock have been created at such low rates of interest.

In 1806, the British government borrowed eighteen millions of money—but the stock created by it was exactly *l* 29,880,000; thus—they gave *l* 70 stock three per cent. reduced; *l* 70 three per cent. consols.; and *l*10, five per cent. navy; making *l*150 stock for *l*100 money; besides, there was *l* 2,880,000 *more stock created than the money produced, at this rate.* Whether this was a *bonus* to the lenders, we are unable to say—the facts are as stated.

Again—in 1808, *l* 10,500,000 were raised—for every *l* 100, the lenders agreed to take *l* 118 3*s* 6*d.* in the four per cents.—making a stock of *l* 12,408,475, and so bearing a *real* interest of nearly five per cent. besides the usual *discounts* and *premiums.*

The foregoing may serve to give a general idea of the nature of the British funds. But we do not pretend to understand the subject minutely, or comprehend clearly, the financial operations of this government. They are surrounded by mystery; and completely known only to the few who "gamble" in them. The annexed explanation of terms will assist the reader to feel the *monied pulse* of the nation, on seeing the price of stocks quoted in the newspapers:

DESCRIPTION OF THE PUBLIC FUNDS.

Navy five per cent. annuities, produced from about fifty millions of stock, partly formed out of navy bills, converted in 1784, into a stock bearing interest at five per cent. whence the name.

Four per cent. consolidated annuities, produced from the same quantity of stock as the last, bearing interest at four per cent. as the title indicates; these annuities are called consols, or consolidated, from the stock having been formed by the consolidation of several debts of government.

Three per cent. reduced annuities, produced by about 170 millions of stock formed from several debts, that originally bore a higher rate of interest, but which, on various conditions, has been reduced to the rate which the name of the stocks express.

Three per cent. consolidated annuities produced by above four hundred millions of stock, in part formed by the consolidation of several stocks, bearing interest at three per cent.

N. B. When the word *consols* is indefinitely used it is always understood to mean these annuities.

Three per cent. imperial annuities, produced by above eight millions of stock created by loans to the emperor of Germany, with the security of the interest being paid by the government of this country, whenever the emperor should fail his engagement.

Five per cent. Irish annuities, produced by about two millions of stock formed by loans for the use of Ireland, before the union.

Bank stock, is a capital of nearly twelve millions with which the company of the bank has accommodated government with various loans, and with which they carry on the banking business, purchase bullion, &c. The dividends on bank stock are now ten per cent.; so that the profits of the company are near twelve hundred thousand pounds per annum.

India stock, forms the trading capital of the East India company; this stock (consisting of six millions) produces an annual dividend of $10\frac{1}{2}$ per cent.

South sea stock and annuities consist of, or are produced from a capital of nearly twenty millions. The greatest part of this is lent to government, for which the company receive 3 per cent. but from the increase of other profits the dividend to the proprietors is $3\frac{1}{2}$ per cent.

The terminable annuities are,

Bank long annuities, so called from the annual payment being from their origin made payable at the bank, and from their being granted for a greater length of time, than other terminable annui-

ties.—These annuities extend to the beginning of the year 1806, and the annual payments are about eleven hundred thousand pounds.

Imperial short annuities, formed in the same manner, and upon the same conditions, as the imperial 3 per cent. annuities: they extend to May 1809.

Besides the permanent loans to government, which have created a perpetual and terminable annuities, various sums have been raised from time to time, as temporary loans, on what are called Exchequer bills, from their being made payable at the treasury of the exchequer.

Exchequer bills, are issued for different hundreds or thousand of pounds, and bear an annual interest of $3\frac{1}{2}$ per cent. per diem, from the day of their date to the time when they are advertised to be paid off.

Navy bills, are merely bills of exchange, drawn at 90 days date, and are given by the commissioners of the navy for the amount of supplies, for the use of that department, and the interest upon those amount to 3 per cent. per diem.

India bonds are issued by the East India company, and bear interest at 5 per cent. per annum.

Omnium, is a term denoting the different stocks formed by a loan, while any part of the loan remains unpaid. For example, suppose 20 millions of money were to be raised, and for every 100*l* in money, are to be given 100*l* stock in the 3 per cents. 50*l* stock in the 4 per cents. and 6s 3d per cent. in the long annuities; then if any person engage to advance 10,000*l* in money, upon paying the first instalment, (for the money is usually advanced at the rate of about ten per cent. per month, until the whole is paid,) he will receive three receipts, which separately contain an engagement to answer to the person possessing them 10,000*l* stock in the three per cents. 5,000*l* stock in the four per cents. and 31*l* 10*s*, stock in the long annuities, upon the whole of the instalments being paid, at or before the appointed time—While these three receipts are sold together, and before the whole of the instalment has been paid they are called Omnium, as they are made up of all, or of several of the stocks.

Scrip, is a term given to each of the receipts of the omnium, they are sold separately: thus in the foregoing supposition, if the receipt containing the engagement to transfer the 10,000*l*. in the three per cent. be sold without the other two receipts, this would be called a sale of script. Immediately the whole of the instalments upon any script is paid, the transfer of the stock is made to the per-

son who holds it, and there is usually a discount allowed for any prompt payment.

N. B. When the stock created by any loan is formed in only one sort of stock, there is properly speaking no omnium; though, then by a misnomer, the script receipt is called by that name.

The prices of the stocks, &c. are exhibited in the lists that are published, in this manner.

The value of any perpetual annuity, thus:

Three per cent. consols, 63 1-8, 64 3-4, 1-2. which

Signifies, that the value of 100*l.* stock of these annuities sold on the day this price is given, for 63*l* 2*s* 6*d* in money at the beginning of the market, that this stock rose to 64*l* 15*s* and left off at 64*l* 10*s*.

The value of any terminable annuity, thus:

Bank Long Annuities, 16 3-8, 16 1-6.

Signifying, that any annual payment of these annuities was worth 16 3-8 years purchase at the beginning, and left off at 16 $\frac{1}{16}$ years purchase at the end of the market.

The value of either exchequer bills, or India bonds, thus:

Exchequer bills, 2 a 4 premium, or India bonds, 1 pr. 2 discount.

This signifies that every 100*l.* in exchequer bills bore a premium of 2*s* at the beginning, which advanced to 4*s* in the end of that day; and that every 100*l.* in India bonds, sold at first at 1*s.* premium, and afterwards sold at 2*s* discount.

The value of omnium is expressed thus,

Omnium 3$\frac{1}{2}$ premium;

And signifies that every 100*l* of omnium, sold at a premium 3*l* 10*s*.

NATIONAL EXPENDITURE.

When queen Anne came to the throne, 1701, the whole annual expenditure, including the interest on the national debt, was	*l* 5,610,987	*peace.*
When George I. came to the throne (1714) just after queen Anne had been at war 11 years	6,663,581	*peace.*
When George II. came to the throne, 1727	5,441,248	*peace.*
When George III. came to the throne, 1760	24,456,940	*war.*
At the end of the American war, and beginning of Pitt's administration, 1784	21,657,609	*peace.*
At the latter end of the war against "revolutionary France," 1801	61,278,218	*war.*
For the year 1809	82,027,288	*war.*
1810	83,099,186	*war.*

TAXATION.

When queen Anne came to the throne in 1701, the yearly amount of taxes was	*l* 4,212,353
When George I. came to the throne in 1714	6,762,643
When George II. came to the throne, 1727	6,522,540
When George III. came to the throne, 1760	8,744,682
After the end of the American war, 1784	13,300,921
At the close of the war against "revolutionary France," 1801	36,720,071
For the year 1809	70,240,229
1810 (nett revenue)	70,235,792

FUNDED DEBT.

The total amount of the capital of the funded debt of the United Kingdom, on the 1st of January, 1812, was

Great Britain - - -	*l* 747,429,339	11	3¼
Ireland - - - -	61,274,250	0	0
Emperor of Germany - -	7,502,633	6	8
Portugal - - - -	895,522	7	9
	l 817,101,745	5	8¼

The unfunded debt of Great Britain, on the 5th of January, 1812, was

Exchequer Bills - - -	*l* 41,491,800	0	0
Navy ditto - - - -	7,883,890	10	4
Ordnance Debentures - -	1,078,476	5	4
Loan ditto			
	l 50,454,166	15	8

That of Ireland was, Exchequer Bills 1,840,787*l.* 17*s.* Loan Debentures 2,225*l.* making 1,843,012*l.* 10*s.* The total for the United Kingdom was 52,297,179*l.* 5*s.* 8*d.*

The total amount of money raised in the year ending January 5, 1812, was, permanent taxes, 35,458,269*l.* 4*s.* 9½*d.* Interest on account of Ireland and Portugal; surplus exchequer fees, imprest monies, and tontine money, 3,003,476*l.* 19*s.* 5½*d.* Duties to discharge three millions of exchequer bills, 2,827,785*l.* 18*s.* 1¼*d.* War taxes, 22,393,053*l.* 13*s.* 5¾*d.* Money paid on account of loans, 19,638,379*l.* 3*s.* 9*d.*; and on account of lotteries, 922,136*l.* 8*s.* The total, 81,241,697*l.* 7*s.* 7¼*d.*

The amount of exchequer bills outstanding on the 5th of April, 1812, was 43,406,800*l.* of which those issued since the 1st of February, 1812, amount to 9,378,500*l.*

The amount of the land-tax assessed in respect of land, in the year ending March 25, 1811, in the counties in England and Wales, was 1,226,321*l.* 5*s.* 2½*d.* The amount then redeemed was 634,365*l.* 8*s.* 1½*d.* In Middlesex, which pays more than double any other county, the amount assessed was 171,665*l.* 1*s.* 0½*d.* and the amount redeemed, 61,914*l.* 5*s.* 9*d.*

The stamped dollars issued by the bank of England from the 19th of February, 1811, to the 13th of April, 1812, inclusive, at five shillings each, amounted to 424,584; and at five shillings and six pence each, to 21,340; the number of silver tokens for the same period, at three shillings each, to 722,446; and at eighteen-pence each, to 3,361,171: the whole making a value of 1,447,469*l.* 4*s.* 6*d.*

The number of re-issuable promissory notes, stamped in England during the year ending the 10th of October, 1811, was 3,563,788. Of these 2,702,563 did not exceed a guinea in value, and 1632 were from 50*l.* to 100*l.* in value. This account does not include stamps consigned to distributors.

The number of stamps for promissory notes re-issuable from February 16, 1811, to the 5th of April, 1812, amounted to 3,323,180. Of those exceeding in value 50*l.* and not exceeding 100*l.* the number was 1396. The total number was 4,455,556.

The number of licences renewed to existing bankers in the year ending October 10, 1811, for the issue of promissory notes, payable on demand, was 696, and to new banks, 83. From the 11th of October, 1811, to the 20th of April, 1812, the number of renewed was 735; and from October 11, 1812, granted to new banks, 52. In Scotland, during that period, the whole number was 50. The total was 824 for the year 1811, and 838 for the year 1812, which last is the number of private bankers in Great Britain for that year (1812).

The following is an account of the total amount of money raised for the public service, in each of the years from 1791 to 1810 inclusive.

	Raised in each Year.		
1791	£18,863,594	19	2¼
1792	18,832,465	5	7¾
1793	22,050,898	8	2
1794	32,102,168	9	4½
1795	37,641,736	12	2¾
1796	60,969,839	8	1¼
1797	49,931,120	0	8½
1798	50,889,326	13	5¾

Michaelmas 1798 to 5th Jan. 1799	10,232,969	16	9
1799	57,434,677	7	3
1800	58,630,216	8	4½
1801	75,743,475	4	10
1802	68,563,718	4	2¾
1803	55,821,209	10	0¾
1804	64,947,614	4	5¾
1805	81,167,978	4	5¼
1806	79,736,321	6	8
1807	81,102,138	10	10½
1808	82,225,110	10	7
1809	93,192,742	10	8
1810	97,948,034	0	1¼

CONSOLIDATED FUND: WAR TAXES.

During the war in which Great Britain has been engaged with the French republic and the French empire, the then existing, and certain other new taxes, were considered by Mr. Pitt as needful to be permanently continued on the people, to answer the public necessities; but certain other taxes which the supposed temporary exigencies of the war called for, were laid, on the expectation that when the war ceased, these taxes would cease also: the first class of taxes, were formed into one fund called the consolidated fund; and consisted of the customs, the excise, the assessed taxes, the land tax, &c. which forming one class of income, is exclusively appropriated to certain payments, of which the dividends, or interest of the national debt is the chief and heaviest charge: If this fund yields more than sufficient to satisfy the demands charged upon it, the excess is brought forward in the budget of the next year, under the head of "surplus of the consolidated fund" as part of the ways and means of raising the supplies wanted for the year. If not, then the deficiency takes its place, not among the Ways and Means, but among the Supplies. The consolidated fund for 1810 produced 42,286,152*l* 18*s* 11*d*. and charges were 35,296,313*l* 10*s* 9*d*. leaving a surplus of 6,979,739*l* 8*s* 2*d*. The same fund up to 5 January, 1812, produced but 40,917,135*l* 18*s* 4*d*. The charges were 36,801,993*l* 18*s* 9*d*. leaving a surplus of 4,115,841*l* 19*s* 6*d*. The decrease was in the customs.

The other taxes which were laid on for the support of the war, under a promise of being temporary, and to be taken off when the war is ended (that is ad græcas calendas) are called the *war taxes*. These consist of additional customs, excise, property tax, &c. In 1811 they produced 22,393,063*l* 13*s* 5*d*.

THE SINKING FUND.

In 1716 Sir Robert Walpole at the suggestion of Earl Stanhope, proposed that the surplus of the aggregate, the south sea, and the general funds, should go to another fund called the sinking fund, and be applied to the repurchase and redemption of the national debt. Sir Robert Walpole however in 1733 wanting half a million sterling, proposed to take it from the sinking fund, under two pretences, 1st, that the country would not support an additional land tax, and 2dly, that the purchasing up so much stock and taking it out of market, was a greater defalcation from the circulation of the kingdom than the monied interest could well bear. He prevailed; and depredations were committed on this fund by him and subsequent ministers, till it was rendered nearly inefficient.

Soon after the close of the American war, Dr. Price proposed to Mr. Pitt, the establishment of a sinking fund, which under the controul of commissioners operating perpetually on the national debt, might produce an interest approximating to compound interest, while the nation paid its creditors at the rate of simple interest only. To aid this, he proposed that when loans were required, the debt should be created by paying large interest on small sums, rather than by borrowing at a low interest, increase the amount of the capital borrowed. Unfortunately, Mr. Pitt through timidity as a financier, rejected the last proposal: but in 1786 he established the modern sinking fund, 1st, by appropriating a capital of a million a year, and then by adding to it divers surpluses of taxes. Lord Lauderdale has objected to the principle of the sinking fund, as taking out of the productive capital of the nation, so much as it redeems of the debt, but I do not see the force of his reasoning. In my mind, this fund faithfully applied during a long continuance of peace, would go far to annihilate the debt of England, enormous as it is: but unfortunately, the national burthens increase in far greater proportion, than this fund can diminish them. At the close of the year 1812, it had redeemed of the national debt about 222 millions; and the fund to be appropriated to the same purpose, for the next year, would be upwards of thirteen millions and a half. The great use however of the sinking fund *to the minister*, is as an engine of Stock-jobbing, to keep up the price of funds, which national disasters tend to reduce.

THE BUDGET.

So called from the Minister's Bag of papers, necessary to elucidate his calculations on the annual statement (Expose as the French call it) of the national finance. The Budget consists of two parts, viz. THE SUPPLIES, or sums wanted for the year; and THE WAYS AND MEANS, or the sources from whence those sums are to be procured. The supplies consist of the sums wanted for the navy, the army, the ordnance, the payment of dividends or interest on the national debt, the expences of the Civil list, (which include the expences of the Royal family, Judicature, Ambassadors, and Royal pensions) and miscellaneous services. The ways and means are, the consolidated fund, the war taxes, and loans, when necessary. To meet the interest of the new loans, the Budget contains also the new taxes proposed for the purpose, with remarks on the principle of the tax, and calculations on its probable amount from known data. To illustrate this I will give the Budget for 1811, which contains much important fact, and a summary of the Budget of 1812.

IMPERIAL PARLIAMENT.

HOUSE OF COMMONS, MAY 17, 1811.

THE BUDGET.

The House having resolved itself into a committee of ways and means.

The *Chancellor* of the *Exchequer* rose to open the Budget for the present year. He began by observing, that having that morning concluded a contract, subject to the approbation of parliament, for the loan for the service of the present year, on terms which he trusted, under all the circumstances of the case, the committee would consider to be highly advantageous to the public, he should proceed to submit to them the details of that contract. But before he did this he conceived that it would be necessary for him to state, with as much clearness as he possibly could, the various sums which the house had already voted for the supply of the present year, and the ways and means to which in his judgment they ought to resort for the purpose of meeting those sums. The supplies which had been voted were as follow:—

SUPPLIES, 1811.

Navy (exclusive of Ordnance Sea Service) -			£20,276,144
Army (including Barracks and Commissariat) - - - - - -		£14,209,422	
Ditto Ireland - - - - - -		3,233,421	
Extraordinaries	England 3,000,000		
	Ireland 200,000	3,200,000	
Unprovided ditto last year - - -		627,098	
			21,269,941
Ordnance - - - - - - - - -			5,012,378
Miscellaneous, including 400,000*l.*			
Irish permanent Grants - - - - -			2,050,000
Vote of Credit	England - -	3,000,000	
	Ireland - - -	200,000	
			3,200,000
Sicily - - - - - - - - - -			400,000
Portugal - - - - - - - - -			2,100,000
Joint Charge - -			54,308,453

SEPARATE CHARGES.

Loyalty Loan - - - - - -	113,416	
Interest on Exchequer Bills - -	1,600,000	
		1,713,416
Total Supplies - - - -		56,021,869
Irish proportion - - - -		6,569,000
		49,452,869
Irish proportion of 54,308,453*l.* - - -	6,389,000	
Ditto Civil List and other Charges - -	180,000	
	6,569,000	

With respect to the Sicilian subsidy, he had to intreat the indulgence of the committee for a great inattention on his part, namely, in having omitted to lay before parliament the last treaty with Sicily, on which that vote was founded. He had erroneously apprehended that the treaty was already on the table of the house, and it was but three or four days ago that he discovered his mistake. To-morrow, however, or the next day at farthest, he would take care to present it to the house, and he hoped they would accept that apology for his omission hitherto to do so. He would proceed to state the various articles of ways and means, by which he proposed to meet the 49,452,869*l.* of supply to be provided by England.

WAYS AND MEANS, 1811.

Annual Duties			£ 3,000,000
Surplus Consolidated Fund, 1810			1,353,715
Ditto	1811		5,000,000
War Taxes			20,000,000
Lottery			300,000
Exchequer Bills			4,000,000
Vote of Credit			3,000,000
Loan	in 5 per Cent. Stock	4,981,300	12,481,300
	in 3 and 4 per Cents.	7,500,000	
Naval Stores			420,364
			49,555,379

It thus appeared that the total of ways and means exceeded the total of the supply in the sum of 102,510*l.* The committee would however, expect that he would enter into an explanation of the grounds on which he calculated the surplus of the consolidated fund of the present year, at the sum of 5,000,000*l.* To do this, it would be necessary for him to detail the produce at which he estimated the various articles that went to the constitution of that fund.

He took the customs at 5,131,000*l.*; being the average of the produce of the two last years. He had taken a similar average last year, being then 4,485,333*l.*, but in fact the customs had produced 4,987,391*l.*; being about 500,000*l.* beyond the calculation. So with the excise, he proposed to take it on the average of the produce of the two last years, or 17,167,000*l.* Of this article he had also taken a similar average last year, being then 16,880,625*l.*; but the excise had produced 17,399,312*l.* This mode of calculation afforded him a fair scheme of estimate; for although the customs for 1811 fell short by about 200,000*l.* of the customs of 1810, yet the excise for 1810 was surpassed by that of 1811 to a similar amount, the excess of the one balancing the deficiency of the other. The produce of the assessed taxes he had last year estimated at 5,860,000*l.*; they had actually produced 5,781,831*l.* and he would take them for the present year at 5,800,000*l.* The stamp duties he had last year estimated at 5,193,000*l.*; they had actually produced 5,302,743*l.* The great increase in these duties during the last year completely justified him in the statement which he had at that period made, that the whole charge of the year might be defrayed out of their excess. To this statement, however, he had added the observation that it was not probable the same excess would exist

in the succeeding year. He should therefore take the amount of the stamps for the present year only at 5,300,000*l.* The post office revenue was estimated by him last year at 1,194,000*l.*; the actual produce was 1,276,000*l.*, and he proposed to take it for the present year at 1,280,000*l.* He could not pass over this particular article without directing the attention of the committee to the great increase that had taken place during the last two or three years in the receipts at the post-office. In 1809, the post-office had produced 1,083,000*l.*; in 1810, 1,194,000*l.*; and in 1811, 1,276,000*l.*; being an increase on the average of about 90,000*l.* a year, and that not from any additional duties on postage, but simply from the augmented commercial communication of the country. It was clear, therefore, that by taking the amount for the present year only, at 1,280,000*l.* an opportunity was afforded to parliament, if they should think it wise and expedient to avail themselves of it, to relieve Scotland, and other distant parts of the empire, without the danger of any diminution of the estimated revenue. The hawkers and pedlars, and sundry small branches of the revenue, he would take at 106,000*l.*; personal estates and pensions at 156,000*l.*; the land tax at 1,038,000*l.*; the surplus exchequer fees at 54,000*l.*; the tontine at 24,000*l.*; the crown lands, &c. at 66,000*l.*; and the imprest monies at 200,000*l.*; making the total of the estimated receipt of the existing permanent taxes for the present year, 36,322,000*l.*—To this must be added 2,240,000*l.*; being the amount of the war taxes appropriated to the consolidated fund; and the grand total would be 38,562,000*l.*; which being deducted from 38,562,000*l.* the estimated produce of the consolidated fund, would leave a balance of 5,649,000*l.* He would, however, take the surplus only at 5,000,000*l.* and would presently account for the disposal of the balance. With the exception of last year, when the surplus of the consolidated fund was 5,753,715*l.*; of the preceding year, when (from peculiar circumstances) it amounted to 7,019,774*l.*; and of the year 1803, when it was 5,936,651*l.*; that surplus had at no period exceeded, or even reached 5,000,000*l.* This was a highly satisfactory circumstance, in contemplating the state of the finances of the country.

The next item which he thought might require some explanation, was the amount of the estimate for the war taxes for the year ending the 5th April, 1812. This estimate was 20,384,000*l.* The grounds on which he calculated he would state as briefly as possible: The average produce of the custom and excise war duties for the last three years, was 9,296,805*l.* The produce of the last year

was 9,727,213*l.*; but he thought it better to take the average of the three last years. Four hundred thousand pounds remained due from the East India company. These sums, added together, made 9,696,805*l.* The nett produce of the assessment of the property tax for the year ending April 5, 1811, was estimated at 11,800,000*l.* This was 400,000*l.* more than the sum calculated upon as the probable produce, though less than the produce of the preceding year, on account of the great amount of arrears received in that year. The amount of the outstanding arrears of the property tax from 1804 to 1810, was 2,246,644*l.* Of this sum, it was expected that a part would be returned by schedules, and part might not be recoverable; he would suppose one-fourth, or 560,000*l.* Deducting this, the amount, therefore, of outstanding arrears that might be expected to be received, was 1,686,644*l.* Of the estimated produce of the duty for the year ending the 5th of April, 1811 (namely 11,800,000*l.*) 4,864,267*l.* had been received, 6,935,732*l.* therefore remained to be received. This added to the 1,686,644*l.* expected to be received of the arrears of former years, made 8,622,000*l.*; which, with the estimated nett produce of the assessment of the present year, which he would take at the same as the last, namely, 11,800,000*l.* gave 20,422,000*l.* From this, however, must be deducted the sum of 7,524,000*l.* remaining to complete the grant of 1810, leaving a balance of 12,898,000*l.* to be received on account of the property tax. Let this be added to the estimate of the war taxes, 9,696,805*l.* and the result would be 22,594,805*l.* There were war taxes, however, to the amount of 2,240,000*l.* already pledged for the interest of the debt, and which must therefore be deducted, leaving the balance to be received 20,354,805*l.* He would however, take it at 20,000,000*l.*

He now came to the consideration of the loan, and of the ways and means in aid of the revenue to meet the expenses of the year. He had already explained to the committee the state of the loan made in the 5 per cent. stock, and the exchequer bills funded in the present session. These amounted altogether to 12,000,000*l.* by which a capital was created in the 5 per centum stock of 12,444,711*l.* The interest on this capital was 622,235*l.* The sinking fund 124,447*l.* The charges of management 3,733*l.* making a total of 750,416*l.* to be annually provided for, for the loan in the 5 per cent. By the loan of 7,500,000*l.* for which he had that morning contracted, a total charge would be incurred of 465,403*l.* 10*s.* The capital created was 7,500,000*l.* in the three per

cents. reduced; 1,500,000*l.* in the consols.; 1,500,000*l.* in the 4 per cents. For each 100*l.* subscribed, the subscribers were to have half 100*l.* in the 3 per cents. reduced, 20*l.* in the consols. 20*l.* in the 4. per cents and 6*s.* & 11*d.* in the long annuities. By calculation made on the price of stocks on the Saturday before, it appeared that the 100*l.* in the 3 per cents. reduced, which was on that day 64$\frac{1}{8}$th, was equal to 64*l.* 2*s.* 6*d.* That the twenty pound in the consols., which were at 65$\frac{1}{8}$th was equal to 13*l.* 0*s.* 6*d.*, and the 20*l.* 4 per cent. which was at 80$\frac{1}{8}$th equal to 16*l.* 0*s.* 6*d.* These sums amounted to 93*l.* 3*s.* 6*d.*; and if to this were added the value of the 6*s.* 11*d.* long annuities, namely, 5*l.* 17*s.* 10*d.* the whole would be found to amount to 99*l.* 1*s.* 4*d.* There was a discount, however, of 3 per cent. on the payment of nine months, amounting to 2*l.* 6*s.* 6*d.* and there would, therefore, be a bonus of 1*l.* 1*s.* 10*d.* on every hundred pounds subscribed. He apprehended that a more favourable loan to the public than the present could hardly have been expected; and he had the satisfaction to state to the house that he understood that it was already at a premium of 1*l.* 10*s.* per cent. It had been contracted also with the expectation that the funds were in such a state as to afford every reasonable hope of an improvement, rather than of a diminution of the advantages to the subscribers.

The amount of the interest on this last loan would be 355,937*l.* 10*s.*; of the sinking fund 106,112*l.*; of the charges of management, 3,344*l.* making a total of 465,403*l.* 10*s.*, which, added to the total of the other loan, made the grand total of charge on the two loans, 1,215,819*l.* The rate per centum, including all charges paid by the public, was, on the 7,500,000*l.* loan, 6*l.* 4*s.* 1$\frac{1}{4}$*d.*; on the 12,090,000*l.* funded, 6*l.* 5*s.* 0$\frac{3}{4}$*d.* The rate of interest to the subscribers on the 3 per cent. loan, was 4*l.* 14*s.* 11*d.* per cent.; on the 5 per cent. loan, 5*l.* 3*s.* 8$\frac{1}{4}$*d.* per cent. The difference on the charges being not quite one shilling per cent. and which difference was attributable to the sinking fund. The rate per cent. on the whole debt created, paid by the public, was 6*l.* 4*s.* 8$\frac{1}{4}$*d.* It was a great satisfaction to him to state that so large a portion of the loan of the year had been funded in the 5 per cents. For on a comparison of the 3 per cents. at present with the 3 per cents. of last year; and of the 5 per cents. at present with the 5 per cents. of last year, the committee would be surprised to observe, how little disadvantageous the bargain in the 5 per cents. had been, as compared with that in the three; the 5 per cents. having been much more stationary and not proportionably depressed. When last year 8,500,000*l.*

only was funded in the 5 per cents. instead of 12,000,000*l.* as in the recent instance, the expense created was 6*l.* 4*s.* 7¼*d.* per cent. In the recent instance the expense created was 6*l.* 5*s.* 0¾*d.*, per cent., making a difference of only five-pence halfpenny per cent. between the two charges. The difference in the 3 per cents. in the two years was much greater. Last year the expense was 5*l.* 13*s.* 3*d.* per cent.; this year the expense was 6*l.* 4*s.* 1¼*d.* Last year the interest was 4*l.* 4*s.* 2*d.* per cent.; this year it was 4*l.* 14*s.* 11*d.*, making a difference of above 10*s.* per cent. This was to him a satisfactory reflection, as he had so pertinaciously persisted in procuring the whole of the 12,000,000*l.* to be funded in the five per cents.

Having thus stated that the whole of the charges created by both loans, was 1,215,819*l.* he should next submit to the committee the mode by which he proposed to meet these charges. Before he did this, he must add, that it was his intention to recommend a repeal of the duty on hats, which, ever since he came into office had continued to decrease in amount. When this tax was first levied it produced 60 or 70,000*l.* He did not suppose that fewer hats were worn than formerly; but the fact was, that the produce of the duty last year was only 29,332*l.* It had been gradually diminishing. In 1808 it was 38,000*l.*; in 1809, 33,000*l.*; in 1810, 31,000*l.*; and in 1811, as he had already stated, only 29,332*l.* This was a rapidly decreasing ratio. He was aware, therefore, that in giving up the duty he did not give up much, for it was gradually wearing itself out. It was the cause of great vexation and trouble to the persons carrying on the trade of hat dealers, and particularly to those who dealt on fair terms, over whom the dealer who was disposed to second the fraudulent wishes of his customers, by omitting the stamp, had a very unmerited advantage. The committee was aware that a similar duty on gloves had formerly been abandoned. Before he came to the resolution of proposing the repeal of the duty on hats, he had seriously considered whether it might not be collected in some other manner; but after a good deal of deliberation, he was persuaded that no mode could be adopted which would not be so inconvenient to the trade and to the public, as to render it highly unadvisable. He begged leave to observe, that if in consequence of the repeal of this tax, it should happen that any persons might be led to imagine, that although the duties on gloves and hats were abandoned, it might be expedient to impose others on coats, waistcoats, shoes, or leather breeches, and in consequence to suggest such new duties to government.

it might be a great relief both to those persons who were so kindly ready to furnish the chancellor of the exchequer with the ways and means of the year, and to that individual himself to state that he did not consider it expedient to tax articles of dress. This notice would not appear superfluous to the committee, if they were aware how many letters he was constantly receiving, in which not only every habiliment which could be named, but even the bolts, handles, latches, and other appendages of doors and windows, were recommended by well intentioned persons as fit objects of taxation.

He came now to that part of his duty which was always considered as the most irksome and unpleasant; but on the present occasion he had the highest satisfaction in stating to the committee, that they had already in the course of the session voted taxes to an amount greater than that which was requisite to meet the burdens of the year; and therefore that he should not propose to lay on a single new tax. The fact, indeed, was, that the sum voted was much larger than was wanted. Of these new duties which had been imposed, the principal was that on spirits; the nature of which had already been sufficiently explained, which had received the sanction of the committee, and the bill to impose which was in a state of great forwardness. The probable amount on British spirits from the most accurate estimate that he could obtain would be 700,000*l.* The produce of the duty on British spirits in the year ending 5th April, 1811, was 2,505,448*l.* to which, if the committee added the amount of duty due from the customs in Scotland, and unpaid for the same year, viz. 360,000*l.* it would make 2,865,448*l.* Upon this the additional duty of 19*l.* 4*s.* 7*d.* per cent. would amount to 551,000*l.* The additional duty of 12½ per cent upon the present excise duties on foreign spirits (exclusive of rum) which produced 1,580,000*l.* in the last year, he would state at 200,000*l.* although he did not expect that it would produce so much. There were other taxes, which, although imposed last year, did not begin to operate till the present. Double the amount of the present duty on timber, on the average of the two last years, would be 622,000*l.* An additional 1*d.* per lb. had been voted by the committee on all cotton wool brought from the American states, and other parts (inclusive of British and Portuguese colonies), being, on an average of the last six years, 35,304,000 lbs. and amounting to 174,100*l.* On pearl and pot ashes imported, except from the British colonies, a duty had been imposed of 4*s.* 8*d.* per cwt. On the average of the last six years, the quantity imported annually was 111,000 cwt. making the sum of 25,900*l.* The duty on foreign linen, in pro-

portion to the quarter ending 5th January, 1811, (when the duty first had full effect) would amount to 71,600*l.*—These various sums, added together, would give 1,617,600*l.* The committee would, however, be aware that these duties were of course subject to such diminution as might be occasioned by the discouragement of the articles on which they were imposed, as they were intended to produce. This diminution would probably not be very considerable for some period; but he had no doubt, and, indeed, sincerely trusted, that they would ultimately be very much diminished, as in proportion to that diminution would the encouragement to English articles increase. These duties he proposed to go in accumulation of the war taxes, and he conceived, that in giving 866,600*l.* to the war taxes he should not be unjustifiable in taking from them 465,403*l.* which sum, added to the produce of the two duties on spirits, viz. 751,000*l.* would give him the 1,215,819*l.* which he required. Then, however, there would be a balance of 300,000*l.* of the war taxes unappropriated and applicable to the ways and means of the year, and also 600,000*l.* of surplus of the consolidated fund. The committee must recollect, that these new taxes had been voted at an advanced period of the year, one quarter having nearly elapsed, and a consequent deficiency of one-fourth ensuing; it would therefore be expedient to meet this deficiency out of the surplus of the consolidated fund, and 250,000*l.* must be deducted from the 600,000*l.* on that account.

He had now to submit to the committee a very important consideration, to which he should call their most serious attention. As soon as the present subject was finished, his right honourable friend (Mr. Foster) would proceed to lay before them the situation of the finances of Ireland. His right honourable friend would have to state that he had borrowed for the service of Ireland 2,500,000*l.* in that country, and that he had borrowed 4,500,000*l.* in England for the same service. To meet the expenses of the loan raised in Ireland, his right honourable friend was ready to propose the necessary taxes; but he (the chancellor of the exchequer) had no hesitation in saying that he trusted the committee would agree with him in thinking that, in the present distressed state of the Irish finances, it would not be wise or expedient to call on his right honourable friend to lay taxes on that country for the purpose of meeting the expenses of the loan of 4,500,000*l.* raised in England. It was therefore his intention to propose to the English members and to the Irish members of the house of commons, that the expenses of that part of the loan raised for the service of Ireland

should be charged on the consolidated fund of England (as a loan to Ireland), in order to procure the public creditor a permanent security, and for at least a twelvemonth, while an inquiry was making into the finances of that country to bear the intesest of the money so raised. He trusted that the committee would be of opinion, whatever might be the issue of that inquiry, that it would be advisable to come forward in the way which he recommended, and out of the comparative affluence of the English finances, to afford aid to Ireland in that, the hour of its particular embarrassment. With a view of furnishing the committee with the means by which this great good could be effected to Ireland, without any inconvenience to this country, he had forborne to take more than 5,000,000*l.* from the surplus of the consolidated fund, leaving a sufficient sum to meet the proposed charge. Though this was a novel proposition, he was persuaded it would be received without grudging, or any indisposition on the part of the committee, to afford to Ireland that assistance which he had shown could be afforded to her, without any material inconvenience to Great Britain. He repeated that the inconvenience would be immaterial; for, what was the nature of the additional taxes, by which the surplus of the consolidated fund would be so much increased as to enable the committee to do that which he recommended? The duty on British spirits had been founded on a principle which had over and over again been recognised by the committee as just. After the experience of last year, namely, having found that spirits had continued to be sold at the increased price to which they were raised when distilled from sugar, there were no reasons to suppose there would be any diminution in the consumption of the article, from the very small advance on the price which the present duty could be expected to occasion. With respect to the other duties, they were all recommended to the committee, on views very different from those connected with finance. They were proposed expressly for the purposes of endeavouring to procure for British shipping those imports, which the war in which the country was engaged, necessarily limited (and which were now enjoyed by foreigners); and of encouraging the exertions of British manufactures, and the consumption of British colonial produce. Policy would have dictated these measures without any reference whatever to their beneficial tendency with respect to finance. He was therefore justified in saying that Ireland might be assisted without prejudice to Great Britain, and he trusted that the assistance would be received in Ireland as it would be given by this country; namely, as affording a

mark of our disposition to lend every possible aid to Ireland under the embarrassing circumstances in which she was placed, and as tending to inforce the necessity and policy of either country stepping to the support of the other, when the one was able to give, and the other so situated as to require assistance.

He believed that he had now stated, as fully and distinctly as he had it in his power to do, all the considerations immediately connected with the subject before the committee. He trusted that he had not omitted any necessary explanation; but before he sat down, he wished to mention a few circumstances, in order to show the general increase of the revenues, and the affluence of the country. For this purpose he begged the attention of the committee to the increasing produce of the customs and excise, during the last five years. In the year ending the 5th of April 1807, the produce of the customs was 9,612,000*l.*; in 1808, 9,123,612*l.*; in 1809, 8,508,258*l.*; in 1810, 10,536,775*l.*, and in 1811, 10,523,169*l.* being an increase of near a million since the year 1807. The produce of the excise in the year ending 5th April, 1807, was 23,740,518*l.*; in 1811, 24,646,022*l.* In the intermediate years the advance was gradual, with the exception of 1809, in which year there was a considerable falling off, the produce being only 22,837,856*l.* In the two succeeding years, however, this depression was completely recovered. An inquiry into other articles of general consumption, would contribute to show the increasing opulence of the nation. The produce of the duties on cotton wool imported into the country in 1807, was 513,526*l.*; the produce in the year 1811, was 1,034,142*l.* The duties on deals and fir-timber imported in 1807 were 566,247*l.* In 1811 they amounted to 642,104*l.* The excise duties on tea in 1807 were 2,844,395*l.* In 1811 they amounted to 3,236,027*l.* This last was a more extraordinary increase, as the article was under most heavy taxation, and as the increase took place after the operation, from which so much mischief was anticipated, of the reduced duty on coffee. All this could be accounted for only by the general augmentation of wealth in the country. Of this increasing wealth a most striking instance was afforded in the consumption of wine. In 1785 the quantity of wine consumed was 14,550 tons; in 1786, 15,087 tons; in 1787, 14,780 tons; making the average of the three years an annual consumption of 14,800 tons. At that period the average price of port wine was 70*l.* 11*s.* 10*d.* per pipe. In 1807, the quantity of wine consumed was 24,090 tons; in 1808, 24,757 tons; in 1809, 22,331 tons; the average of these three years being an annual consumption of 23,726 tons.

At the former period the duty was 30*l.* per ton; at the latter 95*l.* The average price at the latter period 192*l.* 14*s.* per pipe: so that under both the increase of duty and the increase of price the consumption had increased. He could hardly adduce a more striking instance of general prosperity. The average consumption of tallow, for the three years ending in 1787, was 210,174 cwt. The average for the three years, ending in 1809, was 347,870 cwt. The price at the former period was 2*l.* 8*s.* 8*d.* per cwt.; at the latter period, 4*l.* 11*s.* being one third more. Nor did this increase in the consumption of tallow arise from any decrease in the consumption of oil. The average consumption of oil for the three years, ending in 1787, was 9,730 tons; the average consumption for the three years, ending in 1809, was 19,126 tons. The price at the former period was 19*l.* 18*s.* 9*d.* per ton; at the latter period 32*l.* 8*s.* The average quantity of tobacco annually imported for the three years, ending in 1787, was 6,553,000*l.* The annual average for the three years ending in 1809, was 12,491,000*l.* The price at the former period was 8¼*d.* a pound; at the latter 1*s.* 7¾*d.* He was aware that these details were very tedious, but he had the consolation of knowing that they were at the same time very satisfactory, as they afforded the most convincing evidence of the gradual but great increase of the riches of the country.

On the 17th July, Mr. Vansittart, the *pro tempore* Chancellor of the Exchequer, brought forward the budget of the year 1812, and it presented the following series of items:

The expences of the navy - -	£ 19,702,399
The army - - - -	17,756,160
Army extraordinaries - - -	5,200,000
The ordnance - - - -	5,279,897
Extraordinary services - - -	10,250,000
Sundry charges - - - -	4,187,892
Total expences of warlike establishments	62,376,348
The charges of the interest of the debt and the civil list are	36,356,000
Total for the year	£ 98,732,348

The means of raising this enormous *minimum*, for, after all, it is but the *minimum* of the true amount, are taxes and inquisitions on every act of life, and on all articles either of necessity or luxury.

The consolidated fund, or permanent taxes, producing	39,750,000
The War Taxes - - -	20,500,000
The Loan - - - -	20,000,000
The New Taxes - - -	1,900,000

The balance is made up by 3 millions of Annual Duties, by subscription to Exchequer Bills 7 millions, by a Vote of Credit 3 millions, and by smaller items, producing, by the figures on the minister's paper, not more than 40,000*l.* excess, supposing the taxes to produce as calculated. The government have, however, for some time past adopted a means of supplying pressing necessities, by issuing Exchequer Bills, and the present amount of those in circulation is unknown.

The Loan. Bonus. Premium. Scrip. Omnium. Discount.

When a sum of money is wanted for the service of the current year, it is usually borrowed and funded, that is made a part of one of the regular funds; to which, the taxes laid for the interest are also appropriated. The minister gives notice that he shall want so much money, and the monied men, send in, written proposals of the rate at which they will advance the loan, or a part of it. The lowest rate is of course usually preferred.

The minister however does not burthen any one fund with the whole sum required to be borrowed, for this would occasion a difficulty of sale and transfer, by overloading the market with one stock; but divides it among several stocks. Thus, suppose the subscribers are to have 5 per cent. interest for their money: then if they have 100*l.* in the 3 per cent. consols, this will give them but 3 per cent. out of the 5, and is therefore only 60*l.* The minister and they then agree, that they shall also have a certain sum in some of the other stocks, redeemable annuities for instance, which are valued at the current market price. It is evident that this method greatly encreases the nominal amount of the debt. Then the minister sells them a lottery ticket at its original price, and sometimes advantages were also given in the period of payment of the instalment, which gives an advantage of interest, and discount. Whatever all these items make beyond the 100*l.* subscribed to be paid, is BONUS. The advance which the subscribers can actually sell their bargain for in the market is PREMIUM. When they are allowed to pay by instalments, instead of the whole sum at once, and no deduction is made, then they gain DISCOUNT.

SCRIP, is the subscription to the loan or any item of it, brought into market for sale.

OMNIUM. Is the aggregate bargain made with the minister, consisting of all the items belonging to it, such as consols, redeemable annuities, lottery ticket, discount, &c. brought into market for sale.

UNFUNDED DEBT.

Certain great officers of government are allowed in the intervals between the parliaments, to borrow for the national wants such sums as may be necessary by issuing exchequer bills, navy bills, and ordnance debentures. During lord North's administration, these used to be issued payable at 12 and even 18 months; of late years, they are payable at much shorter dates, as 90 days. These are transferable in the stock market. Every now and then, when the quantity issued and thrown into circulation affects the price of stocks, the minister is compelled to fund them; that is, to annex the amount to some one or more regular aggregate or fund; and appropriate taxes to pay the interest. Thus the national expenditure, and national debt, can never be accurately known to the public, until the items of unfunded debt issued within the year, are known and funded.

FINANCE OF IRELAND.

Annual permanent revenue in Irish currency.

1808	Gross produce	5,531,669	Nett produce	4,417,990
09		5,549,191		4,571,406
10		5,416,715		4,280,603
11		5,130,610		3,614,135

	Customs.	*Excise.*	
1808	G. pro. 1,836,843	G. pro. 1,773,760	This comprehends the customs on spirits, sugar, tea, tobacco, and wine; and the excise on malt, spirits, and tobacco.
09	1,991,691	1,538,761	
10	2,364,241	951,851	
11	1,606,752	1,345,403	

The Debt of England, and of Ireland, funded and unfunded, to the first January, 1813, is already given in pages 250, 251, 252.

A TABLE

Shewing the progressive increase of the taxation, expenditure and national debt of Great Britain, from the accession of queen Anne, 1702, to the 5th of January, 1810. Also the amount of debt redeemed from the first operation of the redemption act, 1786, to the first of February, 1810. Together with the amount of all the loans from 1776 to 1810.

		Taxation.	*Expendit.*	*Debt.*
1702	Death of William III. accession of Anne	*l* 4,212,353	*l* 5,610,987	*l* 16,394,702
1714	Death of Anne, accession of George I.	6,762,643	6,633,581	54,145,363
1727	Death of Geo. I. accession of Geo. II.	6,522,540	5,441,257	52,092,235
1760	Death of Geo. II. accession of Geo. III.	8,744,682	24,456,940	146,682,814
1784	After the close of the American war and at the commencement of Mr. Pitt's administration,	13,300,921	21,657,609	257,213,043
1802	After the close of the last war commonly called the French revolution war,	36,728,971	61,278,018	579,931,447
1810	5th January,	70,240,226	82,027,283	811,898,081

The national funded debt 761,117,455*l.* 18*s.* 0¾*d.* *Unfunded debt*, 50,780,625*l.* 14*s.* 3*d.* *Redeemed debt*, 163,679,089*l.* January 5, 1810.

The funding system commenced 1696, eighth year of William III. The first monies raised were laid as duties on salt and stamps, to the amount of two millions. At the death of William III. whose reign was one continued scene of warfare, the debt amounted to 16,394,702*l.* At the death of Anne, 1714, whose reign, the last year excepted, was war, the debt had increased more than three fold, being 54,145,363*l.* At the death of George I. 1727, the debt had decreased more than two millions, being at that period 52,092,235. At the death of George II. 1760, a period of thirty three years from the death of George I. in which two wars had taken place, the debt had nearly doubled, being 146,682,814*l.* In 1784, after the close of the American war, and at the commencement of Mr. Pitt's first administration, a period of twenty four years from the accession of George III. the debt almost doubled itself, being 257,213,043*l.* At the close of the year 1802, the termination of the French revolution war, a period of eighteen years, the debt had more than doubled itself by sixty-five millions, being 579,931,447*l.* From the close of the year 1802, to the beginning of the year 1810, a period of seven years only, the debt had increased two hundred and thirty-two millions, the whole amount of the national debt, funded and unfunded, on the 5th January, 1810, being 811,898,081*l.*

Amount of Loans from the commencement of the American War to the present time.

American War.			French Revolution War.			Present War.		
Date.		*Interest.*	*Date.*		*Interest.*	*Date.*		*Interest.*
1776	£2,000,000	£3 9 8	1793	£ 4,500,000	£4 3 4	1803	£12,000,000	£5 2 0
77	5,000,000	4 5 2	94	11,000,000	4 10 9	4	14,500,000	9 9 2
78	6,000,000	4 18 7	95	18,000,000	4 15 8	5	22,500,000	5 3 2
79	7,000,000	5 18 10	96	18,000,000	4 14 9	6	18,000,000	4 19 7
80	12,000,000	5 16 8	96	7,500,000	4 12 2	7	12,000,000	4 14 7
81	12,000,000	5 11 1	97	18,000,000	5 14 1	8	8,000,000	4 14 6
82	13,500,000	5 18 1	97	14,500,000	6 6 10	9	11,000,000	4 12 0
83	12,000,000	4 13 9	98	17,000,000	6 4 9	10	13,500,000	4 4 3
84	6,000,000	5 6 11	99	3,000,000	5 12 5			
			99	15,500,000	5 5 0			
			1800	20,500,000	4 14 2			
			1	28,000,000	5 5 5			
Total, £75,500,000			*Total*, £175,500,000			*Total*, £111,500,000		

A General View of the National Income and State of Society, in England and Wales, according to Mr. Greg. King's estimate, Anno 1688.

Number of Heads of Families.	Ranks, Degrees, Titles and Descriptions.	Persons in each family.	Aggregate number of persons in the Family of each Rank.	Yearly Income.	Aggragate income of each rank.
				£	£ *sterling*
160	Temporal peers - -	40	6,400	3,200	512,000
26	Spiritual lords - -	20	520	1,300	33,800
800	Baronets - - - -	16	12,800	880	704,000
600	Knights - - - -	13	7,800	650	390,000
3,000	Esquires - - - -	10	30,000	450	1,200,000
12,000	Gentlemen - - - -	8	96,000	280	2,380,000
5,000	Persons in greater offices and places	8	40,000	240	1,200,000
5,000	Persons in lesser ditto	6	30,000	120	600,000
2,000	Eminent merchts. by sea	8	16,000	400	800,000
8,000	Lesser merchants by sea	6	48,000	198	1,600,000
10,000	Persons of the law -	7	70,000	154	1,540,000
2,000	Eminent clergymen	6	12,000	72	144,000
8,000	Lesser clergymen	5	40,000	50	400,000
40,000	Substantial Freeholders	7	280,000	91	3,640,000
120,000	Lesser freeholders	5½	660,000	55	6,600,000
150,000	Farmers - - - -	5	750,000	42½	6,375,000
15,000	Persons of the liberal arts and sciences	5	75,000	60	300,000
50,000	Shopkeep. & tradesmen	4½	225,000	45	2,250,000
60,000	Artisans and handicrafts	4	240,000	38	2,280,000
5,000	Naval officers - - -	4	20,000	80	400,000
4,000	Military officers - -	4	16,000	60	240,000
35,000	Common soldiers - -	2	70,000	14	490,000
50,000	Common seamen - -	3	150,000	20	1,000,000
364,000	Labouring people -	3½	1,275,000	15	5,460,000
400,000	Cottagers and paupers	3¼	1,300,000	6½	2,000,000
	Vagrants, beggars, gipsies, thieves, and prostitutes		30,000		60,000
1,349,586	Net Totals.	4⅓	5,500,520	£	43,491,800

SIMILAR VIEW FOR 1803, BY P. COLQUHOUN, ESQ. L. L. D.

Description of Classes.	Single Persons.	Families.	Aggreg. No. of Persons.	Aggregate Incomes.
1. The Sovereign, for himself, his Queen, and resident family		1	50	£200,000
2. Peers, country gentlemen, and freeholders of lands and houses, &c. mines, minerals, funds and public incomes		167,177	898,775	32,241,000
3. Persons having colonial and East India property, funds, and jointures, &c. including foreign incomes		20,000	160,000	14,000,000
4. Merchants and bankers, deriving income from trade, funds, lands, &c.		15,000	111,000	15,600,000
5. Ship-owners, deriving income from freights and other property		5,000	25,000	2,500,000
6. Manufacturers of all descriptions, including ships, houses, works, &c. &c.		55,300	301,800	24,960,000
7. Inland traders & shopkeepers of all descriptions, trad. on capitals, including publicans		125,000	625,500	16,575,000
8. Agriculturalists or farmers, graziers, and dealers in cattle, &c.		160,000	960,000	19,200,000
9. Established clergy, and dissenters from the church duly ordained		13,526	68,890	2,104,000
10. Liberal professions—*law, physic, literary,* and the *fine arts.*		27,300	136,500	8,088,000
11. Persons employed in the education of youth, including universities		20,500	122,000	3,300,000
12. Persons employed in theatrical and musical exhibitions		500	2,000	400,000
13. Civil and military labourers for the state, and in its defence, &c.	387,079	110,675	466,500	17,494,575
14. Labourers in agriculture, manufactures, commerce, navigation, and fisheries, &c. exclusive of menial servants		1,183,004	5,226,646	53,511,720
15. Hawkers and pedlars, with and without licenses	2,500	800	4,000	100,000
16. Persons employing capitals in asylums for lunatics and deranged persons		40	400	20,000
17. Lunatics supported in asylums	2,500		2,500	75,000
18. Persons confined in prisons for debt	3,510	2,000	10,000	87,750
19. Vagrants, gipsies, common prostitutes, and criminal offenders in prisons and at large	222,000		222,000	2,220,000
20. Paupers included among the class of labourers who only earn part of their subsistence, the deficiency made up by parishes to the amount of	1,040,716			4,267,000
21. Persons, included in all the above descriptions of families, who have money in the funds or otherwise, either as trustees for orphans, minors, and charitable institutions, or on their own account				5,055,955
		1,905,823	9,343,561	222,000,000

(1 Niles's Register, 22.)

General results—Collected from many authorities.

POPULATION.

In G. Britain, including the army, navy, convicts and seamen in registered vessels, by the census of 1801, there were, persons	10,979,089
In Scotland	1,654,000
In Wales	541,546
There were in G. B. under 15 years of age, persons	3,659,796
Males between 15 and 60 years of age	2,744,847
Persons above 60 years of age	819,357
Volunteers in G. Britain and Ireland—(1805)	700,000
Persons employed in agriculture (England, 1805)	1,524,227
in trade and manufactures do.	1,789,539
In the army and navy (1801) men	*469,188
Persons employed in agriculture in Wales (1805)	189,062
Ditto in trade and manufactures	53,822
Paupers—England and Wales: permanent 651,349	
——— occasional relief, 305,899	1,040,716
——— in the work houses 83,468	
Mendicants	50,000
Vagrants, gypsies, &c.	20,000
Idle and immoral	10,000
Prostitutes	100,000
Vagabonds and criminals	100,000
In the friendly societies of G. B. in 1803, there were	674,220
The population of Ireland, (1801) was, persons	5,496,944

Of 63 marriages only three are found without offspring.
Married couples are, to the whole population, as 2 to 11.
Births are, to the population, as 1 to 28.
Menial servants, ditto, as 1 to 11 nearly.

Inhabited houses in England are	1,575,923
Uninhabited do. do.	56,300
Inhabited houses in Ireland	687,618
Uninhabited do.	24,130

There are 122 cities and towns in Great Britain with upwards of 5,000 inhabitants each.

EXTENT, SURFACE, &c.

The sea coast of Great Britain is in miles about	3,800

* The number employed in 1811 is probably about 600,000.

England and Wales contain, square miles - -		49,450
Scotland ditto - - -		27,749
Ireland ditto - - -		27,457
In England there are, acres - - - -		34,271,000
——— acres of uncultivated land - - -		12,151,471
In Scotland, there are, acres - - - -		19,556,540
In Wales ditto - - - -		5,370,000
In the whole island ditto - - - -		50,409,443
In Ireland there are (Irish acres, 7 yards to the rood)		12,001,200

There are 12 acres to every person in Scotland—nearly 10 acres to every person in Wales, hardly 4 acres to every one in England, and about the same space, (in English acres) for each person in Ireland.

MONEY, STOCKS, &c.

Specie circulating unknown; but difficult to be had, and bearing a high premium.

Whole nominal public debt, 1811*	*l* 811,893,082	$3604,805,284
——— Sinking fund	196,546,775	872,678,781
Nominal public debt of Ireland (about)	75,000,000	333,000,000
Bank of England notes in circulation, Jan. 12, 1810—		
Of *l* 5 and upwards	*l* 14,668,640	
Bank post bills	884,120	
Under *l* 5	5,854,170	$93,936,969
Bank of Ireland notes (Oct. 1, 1803)		
Of *l* 5 and upwards 1,769,950 9 11		
Under *l* 5 1,011,891 7 4		$12,351,364
Notes of private bankers in *England* estimated in Oct. 1810	*l* 84,000,000	472,860,000
Notes of private bankers in *Ireland* (Oct. 1810)	12,000,000	53,280,000

The whole public circulating *paper* medium in Great Britain and Ireland, excluding the notes of private bankers in Scotland, of whose business we have no estimate, therefore amount to the *inconceivable* sum of - - - - - - - - $4570,333,417

The rents of lands in Great Britain are	*l* 27,000,000	119,880,000

* The debt for 1812 and 1813, I have already given. T. C.

The *whole* annual income of the people (1805) including revenues, resources and earnings of individuals, *of every description*,	*l* 243,000,000	$1078,920,000
Valuation of all the real and personal property in *Great Britain*	3,000,000,000	$13,320,000,000

Of "Bank Dollars," as they are called, there were

stamped and issued in 1797	- - - -	2,325,099
Ditto 1804	- - - -	1,419,484
Ditto 1809—10	- - -	1,073,051

By Charles II. gold and silver was coined to the value of		*l* 7,524,105
By James II.	- - - - -	2,737,637
Anne	- - - - -	2,691,625
George I.	- - - - -	8,725,921
George II.	gold 11,662,216 silver 301,360	11,966,576
George III. before December 31, 1780	gold 30,457,457 silver 7,480	
From 1780 to 1802,	gold 33,310,832 silver 56,473	86,277,500
1802 to March 25, 1810	gold 22,445,258	
Whole coinage since 'the restoration,' A. D. 1660—equal to		$ 532,459,730

Revenue, Taxes, &c.

The nett revenue, payable into the exchequer, for the year 1810, was	*l* 70,235,792	$ 311,344,695
The loans for the same year produced in *addition*		$ 59,922,777
Poor rates in England, 1810	*l* 6,500,000	$ 28,860,000
Amount of tythes in do.	*l* 5,000,000	22,220,000
The *whole receipt* of the *clergy* in England may be estimated at		44,444,444
There are 2 archbishops and 24 bishops in England, whose *regular* annual receipt is at least	*l* 120,000	532,800

In England and Wales there are nearly 600 *livings* as they are called, under 50*l. per annum*—of which 1071 do not exceed 10*l.*, and 1467, 20*l.*

The proportion of the land tax of Scotland, compared with that of England; is as 1 to 14—.

the landed property is estimated as 1 to 16— and the wealth as 1 to 20.		
The nett revenue for Ireland, payable into the exchequer, for the year ending Jan. 5, 1809—was	£6,174,561	$ 27,415,050
The loans for the same year produced an *addition* of		24,019,292

EXPENDITURE.

Gross amount of expenditure for Great Britain, including payments for interest of the national debt, &c. 1810	£83,099,186	$ 368,959,386
Some of the chief items of which were—		
For the support of the Navy	24,466,998	53,133,461
Army	17,019,729	78,131,594
Ordnance	4,732,276	21,001,347
The *civil list* - - - - -	958,000	4,253,520
The *princes* and *princesses* - -	278,281	1,235,567
On account of interest of the national debt, charge of *management, reduction*, &c.	32,000,000	142,080,000
The public expenditure of *Ireland* for the year ending Jan. 5, 1809, was	9,536,205	42,341,149
Some of the chief items of which were—		
For interest, charge of management and reduction of the public debt	3,359,077	14,914,301
Army - - - - -	3,410,694	15,143,481
Ordnance - - - -	519,184	2,305,176
Miscellaneous services - -	512,197	2,274,154

COMMERCE AND MANUFACTURES.

Shipping belonging to Great Britain and her colonies, Ireland not included, (1805) *tons*,	2,226,000
Ships built in Great Britain, 1810, *registered tons*	122,683
Whole registered tons in the British king's dominions, 1810	2,549,683
Were navigated by - - - - *men*	164,030

British manufactures exported, 1809, *(real value*)*	*l* 44,702,637	$ 198,513,008
Total exports, same year, *ditto*	68,972,743	306,239,089
Imports, same year, *ditto*	46,138,179	204,809,103
Amount of imports and exports *do.*	115,180,912	511,403,649
Ireland——real value of exports, Irish growth, produce or manufacture, 1809	12,577,517	56,954,175
Ditto—imports (about) - -	13,500,000	60,940,000
British manufactures for *home consumption*	92,607,364	408,982,816
Whole value of British manufactures† on an average for 5 years	137,301,605	609,659,086
Real value of Woolen goods *exported*, 1809	13,980,263	61,961,367
——of imports from the West Indies	17,000,000	75,480,000

MISCELLANEOUS.

Members of the House of Commons— For England, 489,—Scotland, 45—Wales, 24—Ireland, 100—total	658

* There is an *official* value and a *real* value. As for instance, the *official* value of goods imported in 1809 is stated at only 27,509,400*l.* though the *real* value is placed at 46,138,479*l.* as above stated, on the authority of a late *ministerial* writer. So as to the exports for the same year—the *official* value was but 38,327,495*l.* and the *real* value is estimated at 68,972,437*l.* By these distinctions, politicians both sides of the question, sometimes, even when telling the *truth*, lead us into gross errors, by giving the *official* value for one part of their statement and the *real* for the other, or *vice versa*, as suits their purpose. From the nature and design of the work from which this part of our table is quoted, we have full reason to believe the *real* value (as it is called) is placed *as high* as it would bear; but have no document whereby to test its correctness.

† This is presumed, for sundry good reasons, to include all the productions of the *mechanic* arts necessary to the ordinary wants of the people, as well as what is generally understood by the word *manufactures*.

The number of the house of lords are indefinite; the king can make as many as he pleases.

In 1793 it was estimated that twenty-four millions of bushels of grain, valued at three millions pounds, were made into drinks in G. Britain.—☞The consumption of grain for this purpose has greatly declined since that period, sugar being substituted for distillation.

There were imported into England for the 3 years, 1802, 1803, 1804, lbs. of wool	18,467,718
Of which there came directly from Spain, lbs.	16,986,644
Annual average from 1804 to 1808 - - -	6,250,000
The value of the wool imported in these years was	*l* 5,560,000

Woolen cloth was never dyed and dressed in England until the year 1667.

The annual consumption of silk in the various manufactures, which is chiefly imported from Italy and India, has been estimated at 11,460 bales—of 140lbs. each—lbs.	1,604,400

☞ The stock has latterly been short—the above estimate is for the year 1807.

The annual consumption of cotton is about lbs. *per ann.*	65,000,000

FROM FORDYCE'S COMMITATUS ANGLORUM.

Stastistics for 1801.

There are in Great Britain including the army, navy &c.—	
Inhabitants - - - - - - - -	10,979,039
Of which under 15 - - - - - - -	3,559,796
From 15 to 60 - - - - - - - -	6,744,847
Volunteers of United Kingdom - - - - -	700,000
Militia of Great Britain - - - - - - -	70,386
Persons employed in England in agriculture - -	1,524,227
——in trade and manufactures - - - -	1,789,532
In England there are acres - - - - - -	34,271,000
—In Scotland - - - - - - - -	19,565,540
—Wales - - - - - - - - -	5,370,000

There are in England scarcely 4 acres to each person, 12 acres to each person in Scotland, and nearly 10 to every person in Wales, about 5 acres to each person in Great Britain, three acres well cultivated are supposed sufficient for each person.

The inhabitants of Ireland are	5,496,944
There dies in Great Britain every year	332,708
Every month	25,592
——week	6,398
——day	914
——hour	40
——three minutes	2

Number of inhabitants in the Thirteen largest Cities and Towns of Great Britain, according to a Census taken in 1801.

London, including Westminster and Southwark	864,825
Manchester	84,020
Edinburgh, including Leith	82,560
Liverpool	77,653
Glasgow	77,385
Birmingham	73,670
Bristol	68,645
Leeds	53,262
Plymouth	44,194
Sheffield	32,166
Paisley	31,179
Hull	29,156
Dundee	26,084

Summary of the Population as lately taken by Government, and presented to both Houses of Parliament.

Population 1801.

	Males.	*Females.*	*Total.*
England	3,897,935	1,343,499	8,331,434
Wales	257,178	234,368	541,546
Scotland	734,581	864,487	1,599,068
Army, Navy, &c.	470,598	- - - -	470,598
Totals	5,450,292	5,492,354	10,942,646

Population 1811.

	Males.	*Females.*	*Total.*
England	4,535,257	4,944,143	9,499,400
Wales	289,414	317,966	607,380
Scotland	825,377	979,487	1,804,864
Army, Navy, &c.	640,500	- - - -	640,500
Totals	6,310,548	6,241,596	12,552,144

	Increase.
England - - -	1,167,966
Wales - - - -	65,834
Scotland - - - -	208,180
Army, Navy, &c. - -	169,902
Total	1,611,882

DISTILLERIES.

The following is the amount of duties paid by the distillery in Great Britain for the last seven years, from the 5th January 1804 to 5th January 1811 :—

5th January	1804	to 5th January	1805	2,322,309*l*	7*s*	8¼*d*
5th ditto	5	to 5th ditto	6	2,305,884	17	1¼
5th ditto	6	to 5th ditto	7	2,313,869	10	7
5th ditto	7	to 5th ditto	8	2,706,563	12	2½
5th ditto	8	to 5th ditto	9	2,757,804	14	9
5th ditto	9	to 5th ditto	10	2,056,079	16	7½
5th ditto	10	to 5th ditto	11	2,427,916	3	5¼

It will be observed, that the returns of the last two years, when the distillation from grain was prohibited, is considerably below that of any of the preceding years. But, besides this diminution of revenue, when sugar is employed, it ought also to be mentioned, in any comparative view which may be taken of the advantages and disadvantages attending distillation from these commodities, that, during these two years, 1811, 1812, there is, besides, a loss sustained of the entire duty paid on the malt in the other years, amounting to *l* 250,000 more annually. The total amount, therefore, of the difference between the last two years of the above returns, when sugar was used, and the two years preceding, when malt was employed, is not less than 1,480,373*l*. 6*s*. 10½*d*. nearly *one million and a half sterling*. Whenever the arguments in favour of each of these two commodities appear to be nearly balanced, we have no hesitation in saying that the consideration of such a loss to the revenue, ought to turn the scale in favour of grain. *Com. Mag.*

Circulation of Bank Notes.—The following is an account of the amount of the Bank of England Notes in circulation on the 25th of each of the first six months of 1811 ; distinguishing the amount of those above and below 5*l*.

1811.	Bank Notes of 5*l.* and upwards, including Bank Post Bills.	Bank Notes under 5*l.*
January 25th	16,443,940	7,305,830
February 25th	15,568,370	7,187,200
March 25th	16,167,750	7,176,280
April 25th	16,662,540	7,331,920
May 25th	15,959,170	7,290,640
June 25th	16,140,360	7,297,200

London Brewery of Strong Beer.—The following is the statement of the quantity of strong beer brewed by the twelve principal houses in London, between the 5th July, 1810, and the 5th July, 1811:

	Barrels.		Barrels.
Barclay	264,105	Goodwyn	85,181
Meux	220,094	Coombe	81,761
Hanbury	142,179	Brown and Parry	72,367
Whitbread	122,316	Elliott	58,042
Calvert	105,887	Taylor	46,222
H. Meux	103,152	Clowes	36,872

Statement of the Emoluments of the Lord Chancellor, &c.—It appears from the Report of the Committee of the House of Commons upon the emoluments of the Lord Chancellor, &c. that his *acknowledged* income in his jurisdiction as Chancellor for the year ending the 5th of April, 1811, was 15,532*l.* 13*s.*; and as Speaker of the House of Lords, for the last year, 6,844*l.* 15*s.* making together an annual sum of 22,377*l.* 8*s.* being an increase of about 7000*l.* a-year within the last ten years. The produce as Chancellor was, last year, almost 3,500*l.* greater than the preceding year, owing to the extraordinary increase of bankruptcies!!

Statement of Balances of Money and Securities of the Suitors in the Court of Chancery, in the different periods undermentioned; as represented by the Lord Chancellor to the Committee of the House of Lords.

YEARS.	*l.*	*s.*	*d.*
1730	1,007,298	14	7
1740	1,295,251	16	3
1750	1,065,160	18	4
1760	3,093,740	0	3
1770	5,153,901	1	3
1780	7,120,537	12	2
1790	10,948,270	7	0
1800	17,565,912	2	8
1810	25,162,430	13	2

Suitors money deposited in the high court of admiralty and court of appeals for prizes on the 1st. January 1810, 461,764*l.* In 1811, 400,750*l.* In 1812, 262,460*l.*

List of *Theatres* in London 1812. Covent Garden will hold 3000 persons. Drury Lane 2800. Opera house 3500. Pantheon 3000. Haymarket or little theatre 1800. Lyceum 2000. Surrey Theatre 2500. Astley's Olympic Theatre 1500. Astley's Amphitheatre 2500. Sadler's Wells 2200. Sans Pareil 1500. Regency theatre 1600. Royalty Theatre 1600. In all about 30,000 Spectators. The population to support these, amounts in round numbers to one million of Souls.

The following is a return of the number of *persons charged with criminal offences*, who were committed to the different gaols in England and Wales for trial, at the assizes and sessions held for the several counties and places therein, in the year 1811; and the total for seven years, from 1805 to 1811.

	1811.	Total in 7 years.
Committed for trial—Males	3,859	24,246
Females	1,478	2,699
Total	5,337	33,945
Convicted	3,165	20,147
Sentences, viz. Death	*494	*2,628
Transportation for Life	29	51
Transportation for 14 Years	34	258
Transportation for 7 Years	500	3,631
Imprisonment, and severally to be whipped, fined, pilloried, kept to hard labor, &c.	2,049	12,587
Whipping—and Fine	147	992
Acquitted	1,233	7,930
No bill found, and not prosecuted	940	5,868
Of whom were executed	39	393

FACTS

Collected from Sir Fred. Morton Eden's pamphlet, On the policy and expediency of Insurance charters. London, 1806.

General view of property insurable in Great Britain.

Houses. (This head of items, must of course be taken from the preceding Census of 1801. T. C.)

Inhabited houses in England and Wales, 1,575,923.

In Scotland 294,553. In all 1,870,476. Uninhabited and building in England, 57,476. Scotland 9,537. Rental of houses, warehouses and manufactories, according to the estimate of Mr. Pitt, in his view of the income tax, six millions sterling; according to Dr. Beeke in his observations on that tax ten millions. (Dr. Beeke's observations on the income tax, is a book of great merit. T. C.) This at 20 years purchase, will be 200 millions. Add for machinery 40 millions, and the gross amount of insurable property of this description in Great Britain, will be 240 millions. Add for Scotland 30 millions, and the amount for Great Britain will be - - - - - 270,000,000

Furniture. England 120 millions. Scotland 15 millions. For the articles of cloaths, plate, books, jewels, houses, carriages, &c. in England and Wales 50 millions; in Scotland 5 millions. Furniture of Great Britain. 190,000,000

Agricultural Stock. Wheat consumed in Great Britain, Guernsey, Jersey, and Gibraltar. 8 millions of quarters (64 millions of bushels) at 40*s.*—Rye and Barley, (of which the distilleries take 500,000 quarters) 5 millions of quarters at 24*s.*

Oats and Beans, the produce of about 3½ millions of acres, 12 millions of quarters at 16*s.* 8*d.* } 32,500,000

Hay, Pease, Hops, Rape seed, &c. about 10 millions of acres.

Sheep from 32 to 38 millions in number in Great Britain.

Oxen about 3 millions. Horses about 1,100,000.

British Manufactures: home consumption 76,000,000

Exportation (real value), too low. T. C. 40,000,000

The items under this head, are thus noticed:

Woollens in 1800, consumed at home 11; exported 8 millions of pounds.

Cotton goods, consumed at home about 6 millions; exports on an average of 3 years in 1799, 4,175,231*l.*

Import of raw cotton about 30 millions of pounds.

Leather goods 12 millions.

Flax (Linen goods) Scotland, England and Wales about 2 millions.

Hemp 2: paper 1: pottery 2: glass 2: silk 3: hardware 6 millions.

Beer 200 Millions of gallons at 1*s*. or 10 million sterling.

Spirits 10 millions of gallons at 8*s*. or 4 millions sterling. This is the produce of half a millions quarters (4 millions of bushels) of grain, as appears by a report of the committee of the House of Commons, of 31 Dec. 1800.

Soap, consumed in 2,260,802 families in Great Britain 1½ million.

Salt, 46,000 tons at 40 bushels each. Duty 10*s*. per bushel, 1 million.

Candles, 2 millions. Miscellanies 10 millions.

Foreign Merchandize. Imports in 1799, 32 millions; real value, 48 millions: of which East India goods amounted to 8 millions:	40,000,000
Works of Taste, Pictures, statues, &c. 10 millions	10,000,000
Shipping, worth 23 millions, of which ¼ insurable while in port	5,750,000
Sundries, Boats, coals, and other minerals, arsenals, &c. &c.	10,000,000
Total	674,250,000

Of all the above species of property, there is now actually insured (1806) two hundred and sixty millions. This appears from the taxes laid on the Insurance of property in 1797, 1802, and 1804, amounting to 2*s*. 6*d*. per pound. In 1785 the gross amount of property insured was 125 millions sterling. In Ireland about 10 millions is insured.

State of the Business transacted at the different Fire Insurance Offices.

Account of sums paid for duty by the principal Fire Offices for the Michaelmas quarter to Christmas, 1809.

Sun	£22,258	15	10	Westminster	£2,790	14	10
Phœnix	14,223	2	10	Eagle	2,682	13	9
Royal Exchange	12,774	8	1	Hand in Hand	2,427	18	7
Imperial	8,470	11	3	London	2,009	2	2
Globe	6,101	8	0	Atlas	1,699	7	0
Hope	4,455	17	0	Union	1,133	10	6
British	4,140	16	0				
County	4,120	13	2	Total	£92,855	3	2
Albion	3,566	4	2				

WOOLLEN MANUFACTURE.

CALCULATION OF SOUTH DOWN WOOL.

[*By a Manufacturer*]

TO THE EDITOR OF THE COMMERCIAL MAGAZINE.

SIR, *August 5th* 1809.

HAVING lately read a very excellent speech of my Lord Sheffield's to the wool growers and dealers, at Lewes fair, on the 24th ult. wherein the sum of 3*s*. per lb. is stated to be a fair price for best South Down wools, and perceiving a calculation of a yard of broad cloath underneath, made from such wool, which is wholly founded in error, and calculated to mislead the public, as well as to do a serious injury to the whole woollen trade, I beg to annex what will be found a more correct statement of its value, supposing it to be made of the best South Down wool purchased of the growers, in the fleece, at the price quoted :—

	L.	*s.*	*d*
I will allow the manufacturer's expences as stated -		6	1½
Fleece wool purchased at 3*s*. per lb. of the grower cannot be rendered (the best not fit to make the cloth alluded to) for less than 6*s*. 6*d*. per lb. of which it will require at least 2½ lbs. - - - - - - - - -	0	16	3
Dying a drab colour, as stated, at 3½*d*. per lb. - -	0	0	8½
	1	3	1
Dying an olive, or brown, will be in addition - - -	0	0	6½
	1	3	7½
A blue at 2*s*. per lb. will be in addition - - - - - -	0	3	9
	1	7	4½

Which will leave but a very *moderate* profit even for the manufacturers at 28*s*. per yard.

I should not have troubled you with the above, had I not seen so many misrepresentations in nearly all the public prints, which have done more injury to the woollen trade than most of the attempts of our enemies.

I am, Sir, your very humble servant,

A MANUFACTURER OF BRADFORD, WILTS.

Report of the Woolen Cloth Searchers in Yorkshire—from the 25th March 1810, to 25th March 1811, in the West Riding, the following return was made :—

NARROW CLOTHS.

This year	158,252 Pieces or	6,180,181 yards.
Last year	151,911	5,951,762
Increase . . .	63,411	229,049

BROAD CLOTHS.

This year	272,664 Pieces or	1,671,042 yards.
Last year	311,239	2,826,048
Decrease . . .	37,575	1,155,006

This diminution of the staple manufacture is to be traced to two causes; the prohibitory decrees of Buonaparte, and the Orders in Council of the British government; by the former of which our broad cloths are shut out from the continent of Europe, and by the latter our commercial regulations with the United States of America are suspended. Seeing the operation of these measures, and having their effects every way before our eyes in the number of artizans that are going about the streets without means of employment, we are not so much surprised that the quantity of woollen cloths have decreased so much, as that they have decreased so little, and this surprise will appear very natural, when the public are informed, that of 1160 shearmen in the town and neighbourhood of Leeds, 400 are out of employment. But a falling off of only 925,957 yards will be in some measure accounted for, when it is considered that the shipments to America for the fall trade in 1810, were as brisk as usual, and that for about six months in that year, the depot system prevailed as much as ever. *Com. Mag.*

GRAIN IMPORTED INTO GREAT BRITAIN.

Importation of foreign Corn and Flour, as laid before Parliament.—The quantity of foreign corn and flour as imported into Great Britain, from the 10th of October, 1809, to the 5th of January following, is 217,546 quarters of grain, and 72,755 cwt. of meal and flour. The aggregate quantity of corn and flour imported into Great Britain in 1809, is 1,482,758 qrs. of the former, and 565,938 cwt. of the latter; of which were imported from Ireland 853,556 qrs. of corn, and 74,993 cwts. of flour; and from all other countries, 629,202 qrs. of the former, and 490,945 cwts. of the latter. N. B. eight bushels make one quarter.

Importation of Corn for the last Ten years.—The following is an account of the value of corn and other grain, and flour imported into Great Britain (except from Ireland) from the year 1800 to 1810, both inclusive:—

Real value (at the average prices of the markets.)

1800	*l* 8,755,995	1806	*l* 1,106,540
1	10,149,098	7	1,878,521
2	2,155,704	8	336,460
3	2,164,592	9	2,705 496
4	1,855,333	10	7,077,865
5	3,754,831		

COTTON IMPORTED INTO ENGLAND.

West India Estates. It appears from a careful comparison of the circumstances relating to the real value of West India cotton estates, (taking every source of expense into consideration,) that the average value of each acre of land may be stated at between 140*l.* and 150*l.* sterling.

Each acre (as proved by an average of ten years) produces about 200 lbs. nett of cotton wool.

Upon an average of three years previous to 1808 (the two succeeding years being omitted on account of the American decrees and the unusual shortness of crops) the plantation expenses or those incurred before shipment came to 7*d.* per lb. The mercantile charges, including the duties (or those between the shipment and the sale), amounted to 7½*d.* per lb. So that the whole expense

upon every pound of cotton, which must be deducted from the gross proceeds of the sale, is 1*s.* 2½*d.*

But during the same period the average sale price has never exceeded 1*s.* 11*d.* per lb. which leaves, after all deductions, only 8½*d.* as the receipt of the proprietor.

Now it will readily be granted that, in speculations in which there is scarcely any risk, 10 per cent. upon the capital, after payment of all expenses, is the reward expected and usually received. Mercantile people know this too well to require conviction from argument. Whenever the hazard is increased, the premium to the advantages is proportionably augmented. Mr. Lowe, in his excellent pamphlet, has well insisted on the point. It will not be denied that speculations in transatlantic property, are precarious in an eminent degree. The uncertainty of crops, risk of health from climate, of property from the enemy, and various other causes, all render it so. Ten per cent. then, as the lowest reward of speculation, may be assumed as the minimum of return due to the cotton planter. This will be more easily conceded, as it is the general admission that this is the proper per centage of the sugar planter, and it is well known that sugar crops are much less affected by contingencies of weather, &c. &c. than those of cotton.

Assuming then ten per cent. as the reward of the planter, the value of each acre to be 140*l.* sterling, and the quantity of cotton produced to be 200lbs., the nett receipt of the planter on each pound of cotton wool should be 1*s.* 5*d.* but the actual sum he receives is 8½*d.* a certain loss to him of 8½*d.*; for if it be once granted, as it undoubtedly must, that 10 per cent. is the fair premium, all below it may be considered as taken out of the funds of the proprietor.

Such is the state of the British cotton-planter. That of his North American rival is much superior. Situate in the midst of the necessaries of life, he depends on himself or his neighbours for support. He purchases land at a cheaper rate, and imports his negroes at an inferior expense. Every thing diminishes the intrinsic cost of cotton properties in the United States, and the regulations of Great Britain increases the value of the produce. The limits of this essay do not permit further details; but should circumstances allow, they may perhaps be laid before the public. At present it may suffice to state that if the North American planter netts 6*d.* per pound he can afford to cultivate cotton. Now the expenses of cultivation, of navigation, &c. are very trifling. Hence he can always undersell the British planter.

Similar local adventitious advantages operate in favour of the Brazil planter, and his receipts from the greater fineness of his produce, are still higher.

Table of Cotton imported annually into Great Britain, from 1797 *to* 1810.

Year	British.	N. America.	Brazil.	Foreign, generally.
1797	6,918,153lbs.			
98	7,909,832			
99	7,529,882			
1800	10,611,349			
1	11,261,014			
2	*8,799,891			
3	5,660,615			
4	20,529,878			
5	21,146,870	34,798,120lbs.	8,198,720lbs.	865,100lbs.
6	19,383,580	34,745,760	7,648,320	2,918,136
7	22,653,270	47,732,440	2,926,880	3,889,740
8	18,168,270	10,435,600	7,622,720	4,843,080
9	19,095,980	41,477,520	23,467,200	14,396,110
10				

The condition to which the cotton planter is reduced, as well as the nature of his claims, having been already stated, the next object of attention is his former situation.

Although the annual average price fluctuated very considerably from the commencement of 1781 to the year 1788, it was never less than 1*s*. 11*d*. per lb. while, in a majority of years, it exceeded 2*s*. making a total average of 2*s*. $2\frac{5}{8}$*d*. per lb.

During the next eight years, from 1788 to 1796, the political derangements of Europe produced severe consequences to the colonists. In 1789, cotton wool fell to an average of 1*s*. 5*d*. In the subsequent years it rose as high as 2*s*. but was very unsteady. The average of the whole term was a fraction more than 1*s*. 6*d*. per lb.

The horizon of the planter seems to have been illumined for the next five years, until 1801: for the minimum of the annual

* The extraordinary diminution of these two years, arose from the cession of the colonies of Demerara, Issequibo, Berbice, and Surinam, to Holland; and from the war, which confined the importation to our own produce. On the re-capture of the above-named colonies, the quantity immediately increased.

average was, during that time, 2*s*. 7*d*. and the maximum 3*s*. 1*d*., and the total average 2*s*. 7½*d*.

In the year of peace it fell to the average of 2*s*. From that year to 1807, it fluctuated between 1*s*. 10½*d*. and 2*s*. 2½*d*. averaging, upon the whole, 2*s*. per lb. sterling.

The prices during 1808 and 1809 were better, but cannot be admitted into a general statement, as they originated in causes so novel and unnatural, that a recurrence of them cannot be expected during another century.

The average of the current year is below 1*s*. 10*d*. and will probably be still less, as the quantity imported of foreign cotton is rapidly increasing. The natural consequence of which is a diminution of price.

From 1781 to 1788 inclusive, cotton wool, as has been already remarked, sold on an average at 2*s*. 2⅝*d*. At that time no duties were levied. Every article required by the colonies was much cheaper. Navigation charges were equally small; and the peace which then existed, favoured the manufactories at home, which benefited the planter.

The actual expenditure was, of course, much inferior to what it now is, while the price was higher.

It may be assumed, as a broad and incontrovertible fact, that the price of every article is double what it was in 1781. The plantation charges may therefore be stated at one-half of what they are according to a preceding statement, that is at 3½*d*. per lb. of cotton wool; and supposing the mercantile charges to have been the same as they now are, they, after deduction of 2*d*. for the duties, are 5½*d*. per lb. Thus, the gross charges upon every pound of cotton wool, would then have been 9*d*, which leaves 1*s*. 5⅝*d*. of actual receipt to the planter of that time.

Lest this mode of estimating be not admissable, let another be adopted, and the results will be found nearly the same. Among mercantile people, 4*d* per lb. was generally supposed sufficient to cover all the difference between war and peace charges. This, it must be remarked, was previous to the present war, since which the duty has been nearly doubled on British cotton. About 1*d*. per lb. may therefore be added to the estimate of the merchants, which increases it to 5*d*. per lb. When this is deducted from 1*s*. 2½*d*. the present expenses, 9½*d*. will remain as the real expense of the former period; and the additional half-penny may be considered equivalent to the enhanced price of every necessary for the estates, though it is in fact below it.

The cotton-planter of these eight years received 1*s*. 5$\frac{5}{8}$*d*. which, from the diminished value of money, was equal to at least one-half more than it now is.

The second period, though less favoured in point of actual receipt, was equally so by the inferiority of every description of expense, and by the non-imposition of duties, as the gross proceeds of sale averaged a fraction more than 1*s*. 8*d*. per lb. The clear receipt was therefore about 9*d*. Had the (W. I.) planter not been favoured, as he fortunately was, the fate which now seems to impend over him would have been then accomplished, and with less destructive effects to the state. It has been his lot to have his hopes raised to the highest pitch, and then, by a refinement in cruelty, to have them dashed away with the rudest violence.

The expenses were somewhat increased from 1796 to 1802, about the middle of which (in 1799) a duty of 8*s*. 9*d*. per 100 lbs. or of a fraction more than 1*d*. per lb. was imposed on British cotton wool; while, strange to tell, 6*s*. 6*d*. per 100 lbs. or about three farthings per lb. was laid on American produce in American bottoms. The average price was 2*s*. 7$\frac{1}{2}$*d*. If the whole expense amounted to 1*s*. 2*d*. which it certainly did not, the planter netted 1*s*. 5$\frac{1}{2}$*d*. which was quite equal to his wants or his wishes.

The diminution of charges during the short-lived peace of Amiens, remedied, to a certain extent, the smallness of the price, which was only 2*s*. per lb. They were about 10*d*. per lb. which left 1*s*. 2*d*. for the proprietor.

From the renewal of hostilities to 1808, while 2*s*. per lb. has been the average price of cotton wool, every thing has happened to diminish the planter's funds. For, immediately on the breaking out of the war, a duty of 10*s*. 6*d*. per 100 lbs. or 1$\frac{1}{4}$*d* per lb. was laid on British, and 7*s*. 10*d*. per 100 lbs. or three farthings and a fraction, on American cotton in American bottoms.

In 1805, this highly improper distinction in favour of the latter ceased, and the duties were increased to 16*s*. 8*d*. per 100 lbs. or 2*d*. and a fraction per lb. on British, and 17*s*. 8*d*. per 100 lbs. or about 2$\frac{1}{2}$*d* per lb. on American produce.

Both, however, are on equal terms when the latter is imported in British bottoms. The duty on British produce was in the following year raised to 16*s*. 10*d*. and has continued steadily the same; that on American cotton was first (in 1808) raised to 17*s*. 10*d*. per 100 lbs. or 2$\frac{1}{4}$*d*. per lb. and lately to 20*s*. 5*d*. per 100 lbs. or about 2$\frac{1}{2}$*d*. per lb. when imported directly, and 21*s*. 1$\frac{1}{2}$*d*. per 100 lbs.

or a fraction more than $2\frac{1}{2}d.$ per lb. when imported indirectly. The former inequality, when imported in British shipping, is still retained.

The Brazilian cotton growers enjoy similar privileges, when they employ British vessels; but pay 1*l.* 5*s.* 2*d.* per 100 lbs. or 3*d.* per lb. in their own shipping.

The British cotton proprietors have therefore been receiving only 10*d.* per lb. during that period, which, however inadequate, is superior to his present receipt, and would not have been so high had the average been made only for the three last years, excluding 1808 and 1809 for the reasons already assigned. It has been shewn to have been no more than 1*s.* 11*d.*

Before this part of the subject is closed, it may be worthy of attention to refer to the table, in which a statement is given of the quantities of cotton imported into this country. From 1804 to the present time, the British have steadily averaged about twenty millions and a half of pounds, while America vacillated from ten millions and a half to forty-seven millions and a half, as caprice dictated. The increase is going on; and early in May, it was one-fifth more than it had been last year.

The Brazil cotton has suddenly increased from seven millions and a half of pounds to about twenty-three millions and a half.

That from India, &c. from about four and a half to fourteen millions and a quarter of pounds.

These facts need no comment; they speak for themselves on terms too unequivocal to be misunderstood.

Importation of cotton wool.—Some idea may be formed of our cotton manufactures by a glance at the report of cotton wool imported into this kingdom during the two last years; an article which we know the (British) markets are not glutted with, neither does it form an article of exportation in its raw state: the great increase of the cotton manufacture from its cheapness over that of linen, must in some measure be a compensation for the defalcation of the manufacture of the latter, at least by an equal provision of labour, although the trade is diverted into a different channel from the original.

Importation of Cotton Wool in 1809 *and* 1810.

From whence.	London.	Liverpool.	Glasgow.	Total 1810.	Total 1809.	Increase.	Decrease.
	Bags.	Bags.	Bags.	Bags.	Bags.	Bags.	Bags.
Heligoland	182	- - -	- -	182	- - -	182	- -
Iceland	15	5,177	- -	5,192	4,824	368	- -
*Portugal	70,450	71,190	1,827	143,467	146,212	- - -	2,745
Spain	2,696	3,938	- -	6,634	8,699	- - -	2,065
Mediterranean	2,612	1,145	- -	3,757	11,112	- - -	7,355
East Indies	79,382	- - -	- -	79,382	33,764	45,618	- -
Africa	- - -	22	- -	22	- - -	22	- -
North America	18,557	191,458	21,828	231,843	143,717	88,126	- -
West Indies	7,944	17,606	14,443	39,993	55,663	- - -	15,670
Demerara and Berbice	2,287	21,008	10,225	33,720	21,178	12,542	- -
Surinam	3,525	1,358	- -	4,883	3,704	1,179	- -
Import. in 1810	187,650	313,102	48,323	549,075	428,873	148,037	27,835
do. 1809	125,870	266,952	36,051	428,873	- - -	- - -	- -
Increase	61,780	46,150	12,272	120,202	- - -	- - -	- -

Total increase 120,202 bags, not including, during the same period the importations at the ports of Bristol and Lancaster, which amounted to 3,449 bags."

I give the preceding tables, for the purpose of showing what exertions Great Britain is making, to render herself independent of the supply of cotton from the United States. Should peace arrive to-morrow, Great Britain, by means of the East Indies, the West Indies, and Brazil, could nearly furnish all the cotton required for her immense manufacture. The plain inference is, that if we do not manufacture our cotton at home, we cannot dispose of it abroad. I know of no manufacture that can be set up with such decided advantages, as that of plain coarse muslins, shirting muslins, and nankeens; and calicoes printed by roller-work. The raw material of the woollen manufacture is daily becoming more scarce and dear: the raw material of the cotton manufacture is daily becoming more plentiful and cheap, or may be made so. You cannot suddenly raise sheep to answer a great demand: you may raise cotton sufficient in one season. Let the cotton-growers look to this: it is *their* business, because it is their interest, to push the cotton manufacture at home to the utmost. Great Britain is very wisely endeavouring by all means in her power to become independent of America, as to the importation of *raw* cotton: why should

* Including the Brazils.

not America pursue a similar policy as to *manufactured* cotton? until the cotton manufacture is established here, peace will bring but little relief to the cotton-grower of the southern states. T. C.

CULTIVATED AND UNCULTIVATED LANDS OF GREAT BRITAIN.

The following table, is from a report of the committee of the house of commons in 1795, but I do not know of any thing more authentic since.

General view of the extent of the island of GREAT BRITAIN, and the proportion between the waste and uncultivated, and the cultivated parts thereof.

	ACRES,
	Uncultivated.
England and Wales - - - - -	7,888,777
Scotland - - - - - -	14,218,244
	22,107,021
	Cultivated.
England and Wales - - - -	39,027,156
Scotland - - - - -	12,151,471
	51,178,627
	Total Extent.
England and Wales - - - -	46,915,933
Scotland - - - - - -	26,369,695
	73,285,628

Of the value of the waste lands of England, were they cultivated to that degree of improvement, of which they are capable, it is difficult to form a correct idea.—We shall submit, however, some data as the basis on which to ground future calculation. Allowing that there are twenty-two millions of acres of uninclosed lands in the kingdom, the whole of these may be divided in the following manner:

	Number of Acres.
Lands incapable of improvement - -	1,000,000
—— proper for plantations - - -	3,000,000

—— for upland pasture - - -	14,000,000
—— for tillage - - - - -	3,000,000
—— capable of being converted into meadow, or water meadow - -	1,000,000
Total	22,000,000

The million of acres, stated to be incapable of cultivation, are here estimated as of no annual value.

The three millions of acres, fit for plantations, may be computed to be worth eight shillings per acre, or in total, 1,200,000*l.* per annum; (annual produce and not rent).

The fourteen millions of acres of upland pasture, when improved, may be calculated as worth five shillings per acre of rent, or 3,800,000*l.* per annum.

The three millions of acres, convertible into arable land, would, when inclosed, average, at least, ten shillings per acre, or 1,500,000*l.* per annum.

The million of acres convertible into meadows, or water meadows, may be estimated at 1*l.* 10*s.* per acre, or 1,500,000*l.* in total.

The total annual produce would then amount to 20,700,000*l.*

POOR OF ENGLAND.

In one way or other about one ninth of the population of England, in 1812, received parish assistance. The returns of the amount of poor rate are to be made duennially to parliament. In 1803 the poor rates amounted to somewhat more than 5¼ millions sterling. I have not seen the return for 1813.

GENERAL STATISTICAL TABLE, 1812.—*No. I.*

The following table has been formed, after much labour, expressly for this work, for the purpose of *general* reference. We are aware that it is incorrect in many particulars, but on the whole it may be accepted as approaching pretty nearly to truth, so far as facts can be discerned in the varied statements of the learned and scientific. And it may serve the *ordinary* purposes of our readers.—*Niles' Reg.*

The whole globe is estimated to have a surface of 148,510,627 square miles—of which the habitable portion is said to have 38,990,569 square miles, and supposed to contain 760 millions of inhabitants.

Asia, is computed to have	10,768,823 sq. miles, &	500 millions peo.
Europe,	2,749,349	160 millions.
America,	14,000,000	50 millions.
Africa,	9,576,208	50 millions.

☞ These estimates are very arbitrary. As to the contents and population of *Asia* and *Europe* the various authors consulted are nearly agreed—but while some of them swell the population of *America* and *Africa* to 150 millions each, there are others who depress them as low, respectively, as 20 or 30 millions. The "*unknown parts*," added to the last given calculations, is supposed to make general content of the *habitable world*, as stated.

The Chinese empire is the most populous, but the Russian the most extensive. The United States have the second rank as to the nominal contents of their territory.

Pekin, *Nankin*, and *Jedo*, rivals in population, are the greatest cities of *Asia*, and are said to have 3 millions of inhabitants, each.

London is the most populous city in *Europe*—by the census of 1810, it contained 1,099,104 inhabitants, of whom 483,781 were males, and 613,323 females.

Mexico is the largest city in *America;* by the census of 1794 it had 112,929 inhabitants, and its population has since considerably increased. *Philadelphia* and *New York* are the next in rank in the new world.

Grand Cairo is the best peopled *African* city of which we are informed—it is computed to have more than 300,000 inhabitants, but there are some reasons to believe that, in the interior, are several cities far more populous, of which we know little at present but from vague rumor—viz. *Tombuctoo* and *Houssa:* the former is said to contain 2 millions of inhabitants.

Empires, Kingdoms and States.		Square miles.	Whole Population.	Capital cities; population.		Inhab. to a sq. mile.	Revenue in millions of $	State tax per head. $	cts.
Empire of China	(A)	1,749,000	383,000,000	Pekin	3,000,000	212	300		79
Russia	(B)	4,900,000	47,440,000	St. Petersburg	180,000	9	60	1	05
France	(C)	236,840	43,423,000	Paris	547,756	184	160	3	06
Japan	(D)	118,000	30,000,000	Jedo	3,000,000	254			
Austria	(E)	131,740	15,519,623	Vienna	250,000	118	32	2	07
Turkey	(F)	960,000	22,000,000	Constantinople	500,000	21	50	2	27
Persia	(G)	800,000	10,000,000	Ispahan	100,000	13			
Birman	(H)	250,000	17,000,000	Ummarapoota		68			
The British Kingdoms	(I)	104,656	16,552,144	London	1,099,104	158	355	21	50
By other statements (T. C.)		156,250	16,552,144			106			
Kingdom of Spain	(K)	150,000	10,327,800	Madrid	150,000	67			
Portugal	(L)	27,280	1,838,879	Lisbon	230,000	69			
Naples	(M)	22,000	4,000,000	Naples	380,000	181			
Denmark	(N)	163,041	2,148,438	Copenhagen	100,000	13	7	3	21
Sweden		160,000	2,353,355	Stockholm	72,000	15	$6\frac{1}{2}$	2	70
Prussia	(O)	44,464	4,559,556	Konigsburgh	50,000	103			
Westphalia	(P)		2,912,303	Cassel	25,000		$5\frac{1}{2}$		
Bavaria		26,176	3,231,570	Munich	40,000	124	8	2	78
Wirtemburg			1,183,000	Stutgard	20,000		3		
Saxony			2,085,476	Dresden	60,000		$5\frac{1}{9}$		
Sicily (island)		10,000	1,500,000	Palermo	180,000	150	$1\frac{1}{2}$	1	00
Sardinia (island)		6,600	456,990	Cagliari	25,000	69	$\frac{1}{2}$	1	00
Grand Duchy of Warsaw	(Q)	27,312	2,277,000	Warsaw	60,000	84	3	1	40
United States of America	(R)	2,000,000	7,239,902	Washington	8,208	4	14	2	00
Confederation of the Rhine	(S)	113,424	15,577,344	———	———	138	$38\frac{1}{2}$	2	48

(A) This includes all the tributary or dependent states. China proper has about 1,200,000 square miles, and, according to *Sir George Staunton*, 333 millions of inhabitants, or 300 to a square mile. This great population admitted, it may be said, *that one half of the whole people of the world we inhabit, obey the Chinese sceptre.*

(B) Russia, in Europe, contains 1,400,000 square miles, inhabited by about 41 millions of people, or 35 to a square mile—their Asiatic possessions are very thinly populated, vast regions being hideous desarts, destitute of fixed inhabitants. The revenues of *China* and *Russia* appear very moderate, compared with their population. But there is nothing more uncertain than the idea we commonly hold of money; its *value* is as various as any thing else. The only way to scale its worth, is by ascertaining the quantity of *labour* it will purchase. In China, for instance, from 12 to 15 days labour, may be obtained for the same nominal amount that a person, at the same business, (be it what it may) would earn in the United States in one day—money is, therefore, 12 or 15 times as valuable in China as it is here. In Russia it is from 8 to 10, for one in the United States. Money is, perhaps, of *less value* with us than in any other country, even in the countries which produce it, Mexico and Peru. We have an idea of a *money-metre*, to shew, by the price of a *day's labour*, the relative value of it in various parts of the world. We may form a table for this purpose.

(C) Travellers having agreed that Japan is as populous as China, have estimated its inhabitants at 30 millions; the apparent difference in the table arises, in part, from Tartary being taken into the general estimate of the latter country, thus reducing the ratio for each square mile; and in part from the deductions made from the surface of the former, for mountainous or barren districts.

(D) France, proper, 148,840 square miles; Holland, the Netherlands, and the former possessions of several petty German princes, 20,000 square miles; the kingdom of Italy, with Istria, Dalmatia, &c. about 50,000 square miles; all which, with Piedmont, Savoy, the former country of Nice, now forming *departments of France*, make up the aggregate. (See next table. T. C.)

(E) Before her late wars with France, Austria possessed 226,876 square miles; 26,970,030 inhabitants, and a revenue of 48,244,000 dollars.

(F) Turkey, in Europe, 9 millions; in Asia, 10 millions; and in Africa 3 millions of inhabitants. Immense regions of country are

desart. The population, as well as the revenue, are mere suppositions.

(G) This country appears to have decreased in its population; caused, perhaps, by the dreadful civil wars that have frequently ravaged it. Besides, there is much mountainous and barren and unproductive land. The revenue is paid in *kind*.

(H) Including Ava, Pegu, Malacca, &c. Ummarapoota is the new capital, but little known to Europeans. The ancient and once magnificent cities of Ava and Peru, are said to be nothing but heaps of ruins.

(I) England and Wales, 49,450 square miles; Scotland, 27,749 do. Ireland, 27,457. By the census of 1810, England contained 9,499,408 inhabitants; Wales 607,380; and Scotland 1,804,864, to which they add for the army and navy 640,500—making a grand total of 12,552,144. We have not seen an enumeration of the people of Ireland—from the accounts laid before parliament, there are probably about 500,000 dwelling houses; averaging them at 8 inhabitants each, we have a gross aggregate of four millions; which is probably about the true amount. The revenue, as here stated, is required for the *present year* 1812, *independent of loans*. It may emphatically be called the *land of taxation*.

[Arthur Young, secretary to the board of agriculture, than whom I know no more competent authority whether for knowledge of the subject, industry, or talent, in vol. 1, p. 283, of his Tour to France and Italy, qto. states his reasons for assigning the following proportions of land to the general divisions of the British Empire in Europe.

England 46,915,933 acres, equal to 73,306 square miles of 640 acres to a mile.

Scotland 26,369,695

Ireland 20,649,961

99,335,589 or in round numbers 100 millions of acres, equal to 156,250 square miles. The calculation adopted by Mr. Niles from Pinkerton, is from Templeman's Geography, which is generally too low. Dr. Grew in the Philosophical transactions No. 330, page 266, calculates the real contents of England and Wales at 46,080,000 acres, which is very near Arthur Young's estimate. Arthur Young and Neckar, calculated France in their time just before the revolution, at 131,722,295 acres, and the population at 26,363,074, or 5 acres per head. See 1 Young's French Tour, 464.

The committee of the house of commons appointed to enquire

concerning the waste lands of Great Britain, in their report of December 23, 1795, stated them at 73,285,628 acres; of which 51,178,627 are cultivated, and 22,107,001 uncultivated. Add 26,049,961 for the acres of Ireland, and the total of England, Scotland and Ireland, will be the same as above, viz. 99,335,589, which shews that they adopted Arthur Young's estimate. Of these uncultivated lands they state as incapable of improvement, one million: lands fit for planting 3 millions: fit for upland sheep pasture, 14 millions: fit for tillage 3 millions: and one million of meadow land. As I know of no authority on this subject that is entitled to so much credit as Dr. Grew, Arthur Young, and the committee of the British legislature, I adopt their calculations, as by far the best evidence we now possess. I have no means of checking this by the agricultural reports of the several counties. I regard the following method used by Mr. Paucton, as one of the best for calculating by a map. On a good map of Great Britain for instance, make an accurate border of wax or dough; lay the map evenly on a table; fill up the interstice with very small shot; weigh the quantity required. Then make a border round some certain portion of which the contents are known, as Middlesex: and the comparison of the weights of the shot, will give with tolerable accuracy, the square miles or acres. T. C.]

(K.) Such was Spain before the invasion by Bonaparte. Its population, has, doubtless, greatly decreased—of the present revenue no estimate can be made; under the old monarchy it was said to amount to 25 millions—or $2 for each head.

(L.) The preceding remarks on Spain also apply to Portugal. The revenue of the crown, the chief of which, however, was derived immediately from Brazil, was estimated at twelve millions per annum.

(M.) The revenue derived by the 'king of the two Sicilies,' from Naples, before his expulsion from the continent, was about 5 millions.

(N.) A very considerable part of the dominions of Denmark, is contained in the mountains of Norway, and frozen regions of Lapland. The provinces of Denmark proper are well populated; and the whole amount of Danish subjects at this time, propably exceeds two millions and a half, great improvements in the condition of the peasantry being latterly made.

(O.) Prussia, before the late war with France, possessed 88,980 sq. miles, with a population of 9,015,130 inhabitants; and the

revenue was about 15 millions of dollars. Its present resources are unknown.

(P.) Westphalia, Bavaria, Wirtemburg and Saxony, are kingdoms lately erected by the emperor of France. They form a part of the "confederation of the Rhine" noticed below.

(Q.) The Grand Duchy of Warsaw, is a power created by France, at the expence of Prussia and Austria, who aggrandized themselves at the expence of the Poles. It has lately been said that this country will be *honored* with a king.

(R.) Including Louisiana—a vague estimate. The population of the eighteen *states* is equal to about 12 persons to a square mile. Our revenue, derived from duties on imports, is constantly fluctuating—we have put it at 14 millions, being about what it would at this time amount to in a *regular* course of things.

(S.) "The confederation of the Rhine" is an association of many petty kingdoms and states, brought about by France, with the chief view (as it appears to us) of acting as a barrier to Austria, Russia, &c. and of otherwise aiding the emperor in his wars.

☞ Blanks are left in those places we could not fill up with *satisfaction*, at present. When better information is afforded, we shall convey it to our readers, and they may complete the table with a pen.

I have taken the preceding table from 3 Niles's Reg. 121, adding the note included in Brackets. This was published in 1812. Niles's Register is a paper that pays much attention to statistical documents, and is therefore valuable.

GENERAL STATISTICAL TABLE, (No. II.)

Of Great Britain and Ireland, France, Austria, Prussia, and Spain.

	For the year 1792.					*For the year* 1812.	
	Great Britain and Ireland.	*France.*	*Austrian Dominions.*	*Prussia.*	*Spain.*	*Great Britain and Ireland.*	*France.*
Extent in square miles	156,000	200,000	240,000	75,000	200,000	156,000	236,840
Population - - - - - - -	15,000,000	26,000,000	20,000,000	6,000,000	12,500,000	16,522,144	43,423,000
No. of persons per square mile	100	125	83	80	62	106	184
Extent in English acres - -	100,000,000	132,000,000	143,600,000	48,000,000	128,000,000	100,000,000	151,577,600
Number of acres to each person	$6\frac{1}{2}$	5	7	8	10	6	$3\frac{1}{2}$
Revenue (Taxes) in Dollars	120,000,000	90,000,000	44,000,000	19,000,000	64,000,000	355,000,000	170,000,000
Amount of public debt in Dolls.	1,800,000,000	1,125,000,000	180,000,000	- - -	220,000,000	2,800,000,000	- - - -
Army in peace - - - - - -	45,000	225,000	360,000	225,000	100,000	- - - -	- - - -
Army in war - - - - - -	150,000	500,000	450,000	350,000	250,000	400,000	800,000
Seamen in peace - - - - -	18,000	- - - -	- - -	- - -	40,000	- - - -	- - - -
Seamen in war - - - - - -	110,000	- - - -	- - -	- - -	100,000	150,000	- - - -
Cultivated acres - - - - -	68,000,000	75,000,000	75,000,000	25,000,000	50,000,000	68,000,000	110,000,000
Taxes per head in Dollars	8	$3\frac{1}{2}$	$2\frac{4}{10}$	$3\frac{16}{100}$	5	$21\frac{1}{2}$	4
Population of the Capital - -	900,000	550,000	250,000	80,000	150,000	1,100,000	600,000

The above table of approximating round numbers, is altered by me, *on a review of authorities*, from a similar table in 2 Niles's Register, 232. The English debt at the close of 1812 I have taken at 850 millions, and deducted 220 millions as paid off by the Sinking fund to the end of that year. There was actually paid off to Aug. 1st. 1811, £215,293,354. The French expose or budget, for 1811, made the taxes of that year amount to 954 (or as I add them) 964 millions of Francs. I believe the above table to be near the truth in all the important particulars for the periods assigned. Every year alters the state of things:

even while I am writing, the power of Buonaparte seems near its close. But the value of the *facts* will remain the same. The philosopher will ask himself, what causes produced the difference between 1792 and 1812? What causes have produced the difference between 1812 and 1814? What part of the statement is likely to be permanent? T. C.

BANKS.

Belzebub engendra *Law*,
Law engendra la Banque,
La Banque engendra Mississippi,
Mississippi engendra Systeme,
Systeme engendra Papiers,
Papiers engendrerent Billets,
Billets ont engendrè Agiot,
Agiot engendra Larrons,
Larrons engendrerent Souscription,
Souscription engendra Dividende,
Dividende engendra Intrinseque,
Intrinseque engendra Argent-fort,
Argent-fort engendra Compte-ouvert.
Compte-ouvert engendra Registre,
Registre engendra Billon,
Billon engendra Zero;
Zero,
Zero s'est enfin trouvè impuisante.

I shall have occasion to say something by and by about BANKS, in mean time I must collect materials and facts, and make a few preliminary observations. The publications of Dr. Bollman on Banks, viz. paragraphs on Banks; and the letter to Alexander Baring, Esq. on the currency of Great Britain, in the second volume of Walsh's American Review, are tracts of sterling merit. I shall probably vary from Dr. Bollman, in my views of the subject.

For the present I shall briefly state the nature of the Bank-establishments of Great Britain.

There is in that country, but one incorporated Bank, the Bank of England, liable by law no further than the amount of their incorporated capital. There are *now* nearly nine hundred provincial banks, of which the partners are individually responsible as in all other cases of partnership, for the debts of the firm. The setting up of any firm, or joint stock company, and selling or transferring shares therein with pretence of liability no further than the joint stock, is made a punishable misdemeanor, by the act of 6 Geo. 1 ch. 18, § 18, called the *Bubble act*. See the *King* against *Dodd*, 9 East, 516; and *Buck* against *Buck*, 1 Campb. N. P. Rep. 546.

The Bank of England was incorporated in 1694, and its capital in 1746 enlarged to 10,780,000*l*., which by accumulated profits has so encreased, as to be lately reckoned at 17 millions sterling.

This Bank, receives deposits, issues notes, discounts bills at sixty and ninety days, and advances money to government; who hold permanently 11,626,800*l*. of the bank capital, as a loan, for which they pay interest.

Bank notes are promissory notes payable on demand in the current coin of the nation, which formerly was silver, but is now gold. Bank notes were usually paid in guineas, till 26 Feb. 1797. But during the year 1796 the calls for cash were so frequent, that the coin and bullion in their vaults scarcely amounted to a million and a half sterling. To lessen this demand, they lessened their discounts from 11 millions to 8 millions; their discounts varying from 8 to 14 millions. On the 6th Dec. 1800, the amount of Bank of England notes in circulation was 15,450,970*l*. in 1810, 21,406,930*l*. at which time the notes of private bankers was estimated at four times as much. This great demand for cash was attributed to the alarm of invasion, and had it gone on, the bank must have stopt payment. On this occasion, government, by the *Restriction act* of 1797, made the bold experiment of ascertaining whether the national business, private and public, could not be conducted without coin, by means of the paper credit of the country, which every individual in it, had an interest in supporting. They forbad the Bank to pay out any more coin: and hitherto the experiment has succeeded. On 24th July, 1811, the act passed making Bank notes a legal tender. Much controversy in and out of Parliament has arisen of late years as to the cause of the increased value of gold and silver, which the committee of the British legislature, has attributed to the stoppage of cash payments, the encreased

emission of bank notes, and the hoarding of coin by individuals, from distrust occasioned by the two former measures.

I do not coincide in this opinion: for I do not believe the circulating bank notes, form one-tenth of the circulating medium, by means whereof, the trade-operations, internal and external, of Great Britain, are managed.

The Provincial Banks of that country were in	1793	280
	1797	230
	1810	796—878
	1811	880

In December, 1810, they were thus arranged.

Country bankers in England who issue their own notes		613
ditto	Wales - - - - - -	25
ditto	Scotland, including branch banks,	83
ditto	London and Westminster - - -	66
ditto	Ireland - - - - -	85
Isle of Man, 1.	Guernsey, 3. Jersey, 2. - -	6
	Total	878

For the most part, these provincial bank notes, promise to pay in bank notes of the bank of England at London.

The trade of the nation, both in Great Britain and America, is carried on, 1st. In a small degree, and in all petty transactions, by cash: banks have the sure and constant effect of driving out of circulation, all cash except what is necessary for current expences of a minor description. 2dly. Bank of England notes. 3dly. Provincial Bank promissory notes. 4thly. Transfer of credits on bank books. 5thly. Transfer of bills of exchange and promissory notes. 6thly. Somewhat in Great Britain and largely in this country, by accommodation notes, or mutual loans of draughts and indorsements, not founded on any real transaction. In England these are greatly discouraged: in this country, they are greatly encouraged.*

Each of these sources of circulation, may answer the purpose of a medium much beyond its nominal amount. Thus, a bank note of ten pounds, or ten dollars, may pass through ten hands in the course of a day, and thus become the representative of transactions to the amount of a hundred.

The transfer of government securities, bank stock, &c. is rather a particular species of trade, than a mode of payment.

* The whole paper circulation of Great Britain and Ireland was calculated (October 1810) at 4,500 millions of dollars; and the whole annual income of the nation at 250 millions of pounds sterling.

Now I cannot conceive that any alteration in the issue of bank of England notes which bear so very small a part, in amunot, in the circulation of the trade of the country, can produce the great enhancement in the price of bullion, which has lately taken place: doubtless some part of the effect is owing to that cause, but assuredly not the whole of it. That encrease depends on many circumstances.

1st. As every commodity will rise in price in proportion to its scarcity, some part of this encrease must be owing to the hoarding up of coin: an effect however gradually diminishing in England.

2ly. The restriction act, has also tended to produce a scarcity of coin, which can now no longer be obtained at the bank for bank notes.

3ly. The wants of the army and navy, take away a great deal of actual cash.

4ly. The sources of bullion supply from Spain and Portugal, have not been so abundant as heretofore, owing to the calamitous situation of these countries.

5ly. The exchange of late years has not been favourable to England: and this calls for cash to pay balances of mercantile transactions.

6ly. Prodigious quantities of coin have been exported, partly on a bullion speculation, and partly to purchase grain, an article of the first necessity. On the 26 July, 1811, lord Sheffield at the Wool fair at Leeds, stated that the value of grain imported into Great Britain in 1800 and 1801, amounted to 19 millions sterling.*

* "IMPORTS.—From a return just presented to the House of Commons, it appears that we imported in 1810

1,387,200 Quarters of Wheat,
533,613 Cwt. of Flour,
503,122 Quarters of Oats, and
33,226 Bolls of Oatmeal.

Of this quantity the imports were—

From France, 334,806 Quarters of Wheat, and 202,922 Cwt. of Flour.

From Holland, 189,016 Quarters of Wheat,
From Germany 145,186 do. and
From Poland and Prussia, 296,756,
From Denmark and Norway, 110,935 Qrs.
From America, 34,829 Quarters of Wheat, and 210,209 Cwt. of Flour.

Hence *more than one-third* of the Wheat, and nearly *one-third* of the Flour, came from France and Holland; while from Ame-

It is to all these causes together, that the scarcity of coin is owing; and therefore they furnish no reason whatever why the bank should be again compelled to pay in specie The prohibition was a very bold measure, but under the circumstances, in my opinion, a very wise one.

But the paper system of that country has undergone a change, which totally alters the nature and complexion of it; and will certainly at some time or other shake to the foundation the whole system of paper credit.

The current medium of England was formerly, the current medium of the world: viz. silver and gold. These were representatives of articles that constituted wealth: that is, of those articles which by exchange could command labour, which is the only universal exponent or prototype of wealth. Then, paper money, on account of its facilitating the operations of trade, supplied in a great degree, and dispensed with gold and silver; but paper money for a long time, remained the exponent or representative of real coin. It is no longer so. It is now, not the representative of real coin which in England is nearly banished, but of *personal credit*; that credit being deemed the exponent or representative of actual, valuable, convertible property, real or personal, which it may be or may not be; but in that country it is so in a reasonable degree. The circulating medium of England then, being no longer the circulating medium of the rest of the world, this state of things will continue and only continue, while the course of exchange remains favourable to that country, or the surplus profits of internal commerce, after maintaining the people, and paying the taxes, is sufficient to counterbalance any unfavourable state of foreign trade. For it is upon its internal commerce that England must ultimately depend; she is rich, not by her foreign trade, but in spite of her foreign trade. But those who guide the helm of that national vessel, are running very close to the wind.

The standard or bank price of gold being *l* 3 17 $10\frac{1}{2}$, the paper price of it at the close of 1812, was *l* 5. 8. 0.

In this country, bank paper is not upon so good a footing as in England. The maxim here is, to bring dead capital into activity,

rica we imported not more Flour than we did from the countries with which we are at war; and the quantity of Wheat from America did not exceed one-fortieth part of the whole quantity imported."

which to a moderate degree is good. But under this notion, banks are created, and paper money issued indefinitely: and it is encreasing to such an extent, that its gradual depreciation is unavoidable, as the reader may well judge from the table, that I shall give in my next. Nobody supposes for a moment now, that a bank note of any kind, is the representative of cash. Nor is our paper equally stable with the British in respect of the following circumstances. 1st. The real actual wealth, upon which the personal credit of that country is founded, is more marketable, than ours: owing to the greater facility of sales from the greater riches of that country. 2ly. Accommodation notes are greatly discountenanced there. 3ly. Every bank, but the bank of England, is founded, not on the limited security of the amount of joint stock, but upon the known character and solvency of the individual partners who compose the firm. Our unlimited issues of paper currency, must ultimately tend to drive away all coin, to raise the paper price of every commodity, to encrease the number of forgeries and the difficulty of detection, and ultimately to sink the value of the paper itself. Banks are now founded, not on the necessities of the country, but of the speculators who set them up. In the end, the evil will cure itself; but it will be severely felt.

The advocates of banks, say, wherever a bank is established, land encreases in value, all kinds of property advance. It is not so; no value is added to land, but the value of paper money is lessened, as is the case with every commodity wherewith the market is overstocked. So far as banks give a temporary facility to public enterprizes, they are of use: they are of great use also in checking the monopolies of monied men, and equalizing, in some degree, purchasers in the commercial markets: but these benefits are greatly overbalanced by the evils arising from their unlimited extension. They banish the precious metals; they tend to check exportation by raising the nominal price of commodities; they encourage irregular trade on fictitious capital; they promote wild speculation; and they strongly tempt to unwarrantable expence and extravagance in the manner of living. In this country, the many kinds of bank paper, will soon make it hazardous to take any; for by and by we shall have no means of detecting the spurious notes. The British government transmitted to France immense quantities of forged assignats. The for-

geries of American papers have been a trade in London ;* need we be surprised if we should be inundated with forged notes ?

A national bank in this country, would be an excellent establishment, if well planned and conducted ; but the constitutional

* *Simulated Papers.*—It is an undeniable fact that the greater part of the difficulties our commerce has felt from the continental powers of Europe have had their origin in the frauds and forgeries of the *British.* Protected by the cannon of their navy, five thousand voyages have been annually made with ships bearing the *American* flag, and completely provided with *counterfeited papers,* which may be purchased in *London* and elsewhere as unceremoniously as a *package of pins.* The vessels thus furnished, and in many instances laden with the productions of the United States, are safely convoyed to the neighbourhood of places to which a simple clearance, from a real American custom-house, would render the vessel liable to seizure and condemnation, the moment she left the waters of the United States ! Here is the operation of the *orders in council.* Englishmen in America begin to blush at the outrageous falsehoods they told in maintaining that these orders were *intended to retaliate* on the Berlin and Milan decrees.—They were originally designed for the simple object of destroying the trade of the United States ; or, more extensively speaking, of forcing the commerce of the world through *British* ports.

The manufacture of simulated papers has become a regular business in England. The *workmen,* like *other mechanics,* publicly recommend themselves to notice for their great experience, &c. and in this they are countenanced by the ministry.

In the course of his late speech in parliament, Mr. *Brougham* read the following circular letter from a "*house*" in Liverpool, announcing that the persons by whom it was subscribed, after labouring some time as apprentices, and being well versed in the craft, had commenced as masters for themselves :— (*2 Niles's Reg.* 166.)

"LIVERPOOL, ———.

"*Gentlemen*—We take the liberty herewith to inform you, that we have established ourselves in this town for the purpose of making simulated papers—(*Hear ! hear !*)—which we are enabled to do in a way which will give ample satisfaction to our employers, not only being in possession of the original documents of the ships' papers, and clearances to various ports, a list of which we annex ; but our Mr. G— B— having worked with his brother, Mr. J— B—, in the same line, for the last two years, and understanding all the necessary languages.

"Of any changes that may occur in the different places on the continent, we are careful to have the earliest information, not only from our own connections, but from Mr. J— B—, who has proffered his assistance in every way, and who has for some time past made simulated papers for Messrs B— and P—, of this town, to whom we beg leave to refer you for further information. We remain, &c. Then follows a list of about twenty places, from and to which they can forge papers, having all the clearances ready by them, from the different public agents, the moment they receive intelligence that any merchant may need their assistance in this scheme of fabrication."

objection to it is so strong, that it ought to be fairly gotten rid of, by an amendment to the constitution in the first instance.

I may probably take up this question again in a future number, when I arrive at the banking part of the United States' statistics. The circulation of Bank of England paper in that country, has already been given.

In noticing this matter Mr. *Stephens* said, "he would ask gentlemen *sincerely* were they prepared to abandon all trade to the continent of Europe on account of these objections *in point of morality*, which had been stated by the hon. mover? [Mr. Brougham.] He felt himself perfectly ready to meet any gentleman upon this ground; and he really believed that he would find few who had *weakness* enough to think, or *hypocrisy* enough to assert, that the whole trade of Europe ought to be abandoned on account of the immorality of FRAUDS *necessarily* practised in the carrying it on. As to the *forging* papers and French consuls' certificates of origin, he was convinced that neither this, nor shewing *false colours* to the enemy, would be supposed so serious an immorality as to make us consent to abandon all our trade." Mr. *Stephens* is the author of the pamphlet entitled '*war in disguise*—or the *frauds of neutral flags*!'

British Manufactures.—To such *manufactures* as are publicly and unblushingly offered for sale in the following advertisement, copied from the *London* Morning Chronicle, of June 12, 1812, we are indebted for a great part of the losses, privations and perplexities suffered on the European continent for many years past. We record the whole notice as a curious article. 3 *Niles*, 63.

"To ship brokers, custom-house agents, notaries public, merchants, &c. Simulated papers and seals, capital counting-house fixtures, 20 very excellent and expensive charts and maps, &c.—By Mr. Sampson, at his warehouse, 16, Size-lane, Bucklersbury, on Thursday next, at 11, by direction of the assignees.

The valuable fixtures and fittings up of the counting-houses, 34 boxes containing *simulated ships' papers and seals for foreign countries*, various coloured inks, foreign writing paper, &c. of Mr. Peter Vander, A. A. merchant, a bankrupt, (removed from his offices, No. 9, Water-lane, Tower-st.) comprising 7 mahogany 1 flap and 2 flap counting-house desks, book case, two capital library and writing tables, with drawers, stamping and sealing presses, a patent instantaneous light machine, an excellent mahogany portable writing desk with secret drawers, two patent polygraphs, several capital charts, amongst which are the Northern Sea, the Cattegat, the Azores, the Atlantic Ocean, the Baltic Pilot, West Indies, British Channel, coasts of England and Holland, Mediterranean, Europe, Asia, and America; Mercator's World; Laurie and Whittle's new map of the British Isles, on spring rollers and boxes: Carey's universal Atlas; a new ledger, journal and waste books, 5 vols. of the beauties of England and Wales, and 95 numbers of do. 6 morrocco leather cases, &c. To be viewed two days preceding the sale, at the broker's warehouses; catalogues may be had of Messrs. Sweet and Stokes, solicitors, Bausinghall street, and of Mr. Sampson, 16, Size-lane, Bucklersbury."

TO READERS:—VARIOUS NOTICES.

I have been in Philadelphia for a short time, during the printing of this number: hence some inaccuracies of printing, and of arrangement have taken place in the present number. Among others, I wish the reader to correct in p. 169, line 9 from the bottom, as follows: for *which*, read, *to which*. In p. 172, the account of the accident from the blowing up of Mr. Trevethick's engine, is from the Philos. Magazine. The account of Mr. Nancarrow's engine, is copied by Nicholson in his 4th quarto volume of his Journal, from the transactions of the American Philosophical society. In p. 218, line 12 from the top, for *upwright*, read, *upright*, and for *presents*, read, *preserves*. In p. 219, line 3 from the bottom, for *using as the metalline substances*, read, *using metalline substances*. Some of my finance collections are not exactly arranged as I could wish, but I do not observe any material error.

While in Philadelphia, I went from thence to Germantown to look at an engine of Messrs. Lang and Hauto, constructed with a view to economise the force of water, and use streams too small to be employed in the common methods of water wheels. The engine in question, is constructed on the principle of the hydrostatical paradox, namely, that the force of pressure of water, depends not upon the quantity, but on the height of the column. Mr. Brama, in London, took out a patent some years ago for a packing-engine, constructed on this principle, to which also he applied a forcing engine in addition to the height of the column. In the principle, therefore, there does not appear to me any thing new: but in the application of this engine to communicate rotatory motion, I think there is great merit. I do not say that this part of the machinery is absolutely new, but it is so to me. I shall give a description of this engine, which ought to be known; for the principle is capable of converting every house in Front and Water streets in Philadelphia, into a manufactory, by the application of the water from the reservoir of the water works.

Sugar.—During the late dearness of sugar, Mr. Patterson, and my friend Mr. Cloud, of the mint, repeated the experiment mentioned in one of my late Emporiums, on the conversion of Starch into sugar, with success as to the general result, but not as to the cheapness. Oil of vitriol is greatly too dear in this country; in England it sells wholesale for 3½ pence sterling per lb.;

the saleable weight is, that a wine pint by measure shall weigh 29¼ ounces.

They then tried an evaporated decoction of malt. By making a wort, or simple decoction of malt (the malt should be put in cold w ater, and gradually heated, for boiling water sets it, as the term is, T. C.) and evaporating this to the consistence of common molasses, they produced a species of molasses sufficiently similar to the common article, and sweet enough to be used with coffee, at an expence of materials that would amount to about thirty-five cents per gallon. This experiment deserves to be repeated in every family.

I do not give Mr. Cloud's method of making Seltzer water, or his method of procuring Zinc from the common brown and black blende, because I hope he will give these processes himself.

Gunpowder.—I observe in the papers the following advertisement. I know nothing of the improvements suggested, but from the advertisement itself; and I have no knowledge whatever of the advertiser. I copy it, as notice of the application of steam to the manufacture of gunpowder, which I believe to be practicable, and also to be a real improvement. Whether it be adopted in England or not, or whether among the numerous patents granted for the application of steam to the arts and manufactures of that country, any patent has been taken out for its application to gunpowder, I know not. I wish somebody would publish a list of patents taken out in that country and in this, from the date of the first vol. of the Repertory of Arts, in 1794, to the present time. I have not the command of more than 20 volumes. I have no doubt but very many of our home-bred patents would be found in the English collection. I will take an opportunity, ere long, of giving my opinion on patent rights. But I have at present no intention of applying this remark to the subsequent advertisement, for I know not the process. Steam has long been applied in England to the warming of buildings, to medicinal baths, to the heating of boilers, to dying, to bleaching, to soap-boiling, to distilling, to the heating of drying-houses, as malt-floors, &c. &c. and also to the drying of gunpowder. Mr. Woolf in the description of his boiler, which I shall give in my next, expressly notices the application of steam to the gunpowder manufacture; and it is stated as being generally introduced, in the article *gunpowder*, Rees's Encyclopedia. However, as it is certainly a very feasible, and very important improvement, I give place to the following advertisement.

"*To Powder Manufacturers.*—The subscriber has obtained from the United States a patent right, for three very simple and important improvements in the manufacture of gunpowder, which do most truly diminish more than one half the risk, the waste, and the expence of the manufacture. They consist in boiling the ingredients by steam, in incorporating them without the objection of barrels, the danger of pounders, or the tediousness of stones running on their edge: and in the granulations effected by a simple machine turning by hand or water, and graining more in a day than twenty hands, losing not a particle of dust, and making not half the ordinary quantity for re-manufacture. The advantages of this mode have been so great, that he had to discharge half of his workmen from his manufactory, as will be readily accounted for by those accustomed to the tediousness and loss from graining, particularly the press powder by the sifter and rollers.

The terms on which he will dispose of his improvements are as follows:

For the privilege of using the steam and his wheel for incorporation, which he will supply, and have put up in any part of the country at his own expence, within 60 days from the arrival of his workmen, one thousand dollars for each hundred pounds of powder they are able to manufacture daily. None less than three hundred pounds will be undertaken.

For his granulating machines, also made and put up at his own expence, he will charge and must be secured in the payment of so much as the manufacturer shall save, by discontinuing the operations of the sifter for the first year, one half for the second, and one fourth for the third, and the same for the fourth years, to be paid at the expiration of the years, after which no further charge. This amount is to be ascertained on the fairest principles in the beginning, and nothing is to be paid if the machine do not fully answer the object. It is of so simple a nature, so impossible to get out of order, or under any circumstances to be a source of danger, that should any person wish it he will for the first year have one of his hands to grain, and will guarantee all losses that it shall from its operations produce, no one, however, will require this, who will observe the perfect safety and simplicity of the contrivance.

The established manufacturers wishing only the granulating machine, will state (letters postage paid) the quantity of powder they daily make, and immediately after they shall have one of corresponding capacity put in operation free of all expences, but the allowance for saving, to be paid for as above."

Georgetown, December 30. THOMAS EWELL.

Steam Engine applied to Weaving.—Towards the close of the session of parliament, in 1809, a motion was put and agreed to, for granting 10,000*l.* to Dr. Edward Cartwright, for applying the use of steam engines to the working of looms. It appeared from the report of Mr. Banks, the chairman of the committee, that although this gentleman made a very useful discovery, and for which he obtained his majesty's letters patent, it was not for that alone he obtained remuneration, but that in the year 1792, the weavers at Manchester, rose and destroyed all his apparatus; in consequence of which it was alleged, the government was deficient in protecting his property, and for this the sum was granted. It appeared also, from the report of the committee on the case, that great advantage had arisen from the invention, and that the Dr. had expended 30,000*l.* in bringing it to perfection.

Filtered Aquaducts.—The corporation of Philadelphia, I observe, are making a Reservoir above the Upper Ferry. The great objection to the hydrant water, is its muddiness. I recommend to public notice the following account, which ought at least to stimulate the directors of the Philadelphia reservoir, to adopt this very simple, but prodigious improvement in the wholesomeness, and pleasantness of our most necessary beverage. I fear, however, I shall preach in vain. For ten years last past, I have occasionally written against the nuisance of a smoking fire place to a steam engine, but without effect. Doubtless they are proper subjects of indictment, but no one cares how much fire and smoke the monsters pour forth open mouthed, over the devoted city. Nothing would give me greater pleasure than to hear of a dozen or twenty new steam engines in Philadelphia, for manufactures will never flourish as they ought, till steam engines are common. I hope too they will all smoke lustily, till the nuisance be really felt.

"An abundant supply of good water is one of the most indispensable requisites for the cleanliness and health of the inhabitants of our large manufacturing towns in particular; and although improvements have been made in this respect, more or less, throughout the United Kingdom, yet much more still remains to be done, and the attention of the public at large should be called to this very essential point.

"Till lately, collections of spring water have been preferred for the purpose of supplying towns by means of pipes, from its supposed greater purity; but experience and the progress of science have proved that spring water is far inferior to river water for this

purpose: river water contains impurities visible to the eye; spring water contains them in a state of actual solution, and therefore invisible. From the former, the impurities will separate themselves almost entirely, by rest or by filtration; from the latter they cannot be separated by means adapted to the demands of common life.

"London, which is extremely healthy for its size, has long been supplied with river water, and to this, more than to any other circumstances, are the inhabitants indebted for the health they enjoy, though few of them ever take the trouble to filter the water they use, even for culinary purposes. The city of Glasgow, which till lately had no supply of water but from wells, has at length the prospect of an inexhaustible supply from the river Clyde, by means of pipes and steam engines. Two companies have embarked in similar undertakings; one of them under the direction of Mr. Thomas Telford, civil engineer, undertakes to bring in a large supply from the eastward of the town; the other company, under the direction of Mr. Robertson Buchanan, to bring in a similar supply from the westward. Both works are in considerable forwardness, and many houses are already supplied with pipes; but the circumstance which demands most attention from the public, and which is our principal reason of mentioning these undertakings, is *the filtration of the whole supply of water, by means of reservoirs constructed for that purpose.* This salutary process is effected by making the water filter through sand and gravel from the large reservoir into which it is first elevated by the steam engine, into a second reservoir deposited a little lower, and from which the conveying pipes receive their supply.

"This is the first instance, we believe (and well deserving imitation), that has as yet occurred of water being filtered on so large a scale, and when its advantages, not only to the health of the inhabitants, but to bleachers, dyers, and all other manufacturers, are duly considered, we cannot doubt but that it will be adopted in all future undertakings for supplying towns with water. Hitherto all branches of manufacture connected with the use of water have been obliged to be *carried to the water*, and the necessary hands along with them, and much expence for carriage and extra labour has been added to the price; but should this system become general, manufactures will be carried on where the necessary supply of labourers can be most easily procured, and where the goods so manufactured can find the most ready market.

"We belie ve that the filtration of water intended for public sup-

ply was first practised by a private individual at Paisley. This public spirited adventurer was amply remunerated for his expenditure, and we cannot doubt but that similar speculations on a larger scale, if properly conducted, will yield an ample return to the first subscribers. We hope the example which has thus been given will be followed by public spirited individuals in other large towns. Its benefits would soon be felt, and it would yield advantages to the community in general, which cannot be calculated upon." (4 *Comm. Mag.* 121.)

Sheet Iron. Ordnance. Iron Cables.—In consequence of information requested of me, I have found it necessary to make some enquiries, as to the manufacture of *Sheet Iron.* The fault of this article when made in this country, is stated to be, that the plates, or sheets, are rough and uneven in consequence of the scales they acquire in the process of heating for the purpose of being rolled. The appearance of the plates is mended, by being annealed or slightly blued, but this is no cure for the evil. My notions on the subject are these.

Every metal, particularly Iron, when exposed to atmospheric air in a red heat, will attract and combine with the oxygen of the atmosphere, and become oxyded. The oxyded iron will either scale off, or remain upon the plate in the form of scales, and make it rough. The cause of the scales and of the roughness of the surface, therefore, is oxyded iron. The cause of the iron becoming oxyded, is that a current of air, not deprived of its oxygen by the coals, comes in contact with the hot iron, and deposits its unconsumed oxygen in the metal.

When a plate of iron is laid upon charcoal for the purpose of being heated previous to its being rolled, the interstices of the charcoal admit more air than the charcoal can consume, or de-oxygenate: that air combines with the under side of the plate, which thereby becomes rough and scaly: the upper side of the plate becomes less so, because the air that passes over it is in part deprived of its oxygen. If there be three plates, the bottom of the undermost will be most oxyded, and then the top of the uppermost. The middle plate will be free from scales: it is heated in the same manner as if it were in a muffle, which is the method of heating the iron intended to be rolled, in some parts of England, and effectually prevents the imperfection complained of.

If, instead of charcoal, a bituminous stone coal is used, the iron plate comes away from the fire much purer and cleaner. The

coals are apt to coak together, and admit no more air through them, than they can decompose: besides which, the smoke of the coal greatly tends to decompose the current of air which passes immediately under the lowest plate. Coal, therefore, is the best fuel for the purpose; that is, the coal that smokes and flames, while it burns.

But, *if the rollers be well greased* while the iron is passing through them, which they ought to be, the scales separate, the surface becomes smooth, and a fine bluish colour can be afterward given by proper annealing, if it be necessary to please the eyesight.

While I am upon the subject of iron, I feel much inclined to regret that the Ordnance with which our Navy is supplied, is not better than I hear it is. I do not know the fact, but I am told, that had the guns on board Commodore Rogers's ship been good, he would have taken the Little Belt: and that Commodore Chauncey was nearly killed by the bursting of a cannon; an accident that happens so frequently on board our vessels of war, as to become an evil of great magnitude. About a month ago a general officer in our regular army, told me, that he had seen a lump of lead about five pounds weight taken out of a cannon; the lead had been run in to conceal a defect in the casting. If this be the case, some remedy should be applied.

In England, spring-chains of iron have been substituted instead of *Cables*. In 1812 three ships of the line were thus fitted up: whether the improvement, if it be one, is continued, I know not.

Thermometers.—The following formulæ for the conversion of the degrees of the various Thermometers that are in use in this country, in England, and the continent of Europe, into each other, will be found useful to a chemical and philosophical student.

To convert the degrees of Reamur's into those of Fahrenheit's. $\frac{R\times 9}{4}+32=F$. 2d. To convert those of Fahrenheit into Reamur's. $\frac{F-32\times 4}{9}=R$. 3d. To convert Celsius's into Fah. $\frac{C\times 9}{5}+32=F$. 4th. To convert Fahrenheit's into Celsius's. $\frac{F-32\times 5}{9}=C$. 5th. To convert Celsius's degrees into Reamur's $\frac{C\times 4}{5}=R$. 6th. To convert Reamur's into Celsius's. $\frac{R\times 5}{4}=C$.

Thus we may convert the one into the other with the greatest facility, but to such readers as are unacquainted with the algebraic expressions of arithmetical formulæ, it will be necessary to express one or two of them in words, in order that their use may be understood. First, then, To convert the degrees of Reamur's into those of Fahrenheit's: Multiply the degree of Reamur by 9, divide the product by 4, and to the quotient add 32; the sum expresses the corresponding degree on the scale of Fahrenheit. Second, To convert the degrees of Fahrenheit into those of Reamur: From the degrees of Fahrenheit subtract 32, multiply the remainder by 4, and divide the product by 9, the quotient will be the degree according to the scale of Reamur. And so on for the rest.

Poppy Oil. Benni Seed. Ben Nut. At Harmony, half a day's ride from Pittsburgh, (both places objects of very great interest) the settlers, use oil expressed from the poppy seed, exclusively, in lieu of olive oil for sallads, &c. It is nearly, if not quite equally good. This oil is becoming common in Europe as a substitute for olive oil. The poppy seed, may be eaten with impunity when ripe. I do not see why its use should be confined to the settlement of Harmony. The Ben, Bene, or Benni Seed common in the Carolinas, can furnish, as I am informed, oil enough to supply the United States at a cheap rate. I have eaten the oil of the Ben or Behen nut in England, and I find no difference between it, and olive oil. Why should this last be imported? But I doubt whether the Ben or Behen nut be the same with the Benni seed. I suspect this last to be the *Sesamum;* but I have never seen it. The Behen nut, *Glans unguentarius, Balenos murepsiki,* is the fruit of the *Guilandina Moringa.* The oil is prepared in the Levant, in Egypt, in Syria, and in Italy, by expression. It is valuable for its purity, and its freedom from smell and taste, and for its property of remaining long without alteration or rancidity, which makes it extremely valuable in pharmaceutical preparations. Rees' Encyclopædia.

Madder.—A few years ago, I procured from England, and I distributed in Philadelphia some plants of the Smyrna Madder *(Lizari)* to Mr. Bern. M'Mahon, to Mr. J. Vaughan, to Mr. Jos. Clay, to Mr. Seth Craig. I know not what has been done with them, or whether any of the plants lived. I do not know a more valuable present that could be made to the cotton manufacture of this country. The Turkey red cannot be well dyed with the Dutch, Zealand, or Crop Madder. I mention this in consequence of knowing that the Harmony settlers, raise all their own madder, for

their extensive woollen manufactory, why cannot this be done every where?

English Madder.—Mr. Spencer Smith has lately introduced that valuable plant, Smyrna Madder, into this country. Mr. Smith furnished the society of Arts with some seed, from which Mr. Salisbury, of the Botanical-garden, Sloane-street, has raised plants that have grown in the most promising manner; he expects to obtain seed from them, and there is every reason to hope that this useful dye-root will, in a short time, become naturalized to our soil. *(3 Comm. Mag. 248.)*

Query on the Cultivation of Madder, and Observations thereon.

To the Editor of the Tradesman, or Commercial Magazine.

SIR,—In looking over the list of articles permitted to be imported to this country from the enemy under his majesty's Orders in Council, and for which it should appear that we stand in great need for the support of our manufactures, I observe the article of madder one, and on referring to the custom house lists of importation, I see that article makes a very conspicuous figure against our balance of trade. As this is an article mostly brought from Holland, it may be inferred that the climate of England would not be unfavourable thereto; and although the great argument is for cultivating every possible spot with the more necessary article of corn, yet there are many unprofitable and considerable spots of ground unoccupied, quite unfavourable to wheat or other corn, that I may presume might be occupied by the cultivation of madder; I could therefore wish to know if it has been attempted, and with success in this country. If trial has not already been made, it is not too late to attempt it, and at the same time I beg leave to close my question with the following account of the cultivation of that root, for the benefit of those whom it may concern, taken from the French Journal de Physique.

This plant may be propagated either by offsets or seeds; if the latter method is preferred, the seed should be of the true Turkish kind, which is called *lizari* in the Levant. On a light thin soil the culture cannot be carried on to any degree of profit, that soil in which the plant delights is a rich sandy loam, being three feet or more in depth. The ground being first made smooth is divided into beds four feet wide, with alternate alleys half as broad again as the beds; the reason of this extraordinary breadth of the alleys will appear presently. In each alley is to be a shallow channel for the convenience of irrigating the whole field, &c.;

that part of the alley which is not otherwise occupied may be sown with legumes.

"The madder seed is sown broad cast in the proportion of from 25 lbs. to 30 lbs. per acre, about the end of April. In a fortnight or three weeks the young plants begin to appear, and from this time to the month of September, care must be taken to keep the ground well watered and free from weeds; if the plants are examined in autumn they will be found surrounded with small yellow offsets, at the depth of two inches; and early in September the earth from the alleys is to be dug out, and laid over the plants of madder to the heights of two or three feet, with this the first year's operation finishes. The second year's work begins in May, with giving the beds a thorough weeding, and care must be taken to supply them with plenty of water during the summer; in September the first crop of seed will be ripe, at which time the stems of the plants may be mown down, and the roots covered a few inches with earth taken as before out of the alleys. The weeding should take place as early as possible in the spring of the third year, and the crop, instead of being left for seed, may be cut three times during summer for green fodder, all kinds of cattle being remarkably fond of it. In October the roots are taken up, the offsets carefully separated and immediately used to form a new plantation, and the roots, after being dried, are sold, either without further preparation, or ground to a coarse powder and sprinkled with an alkaline ley. The roots lose four-fifths of their weight in drying, and the produce of an acre is about two thousand pounds weight of dry saleable madder.

"I need not take up more of your time or place by pointing out the variety of uses this root is of, particularly in various colours for dying, nor pointing out the profit to be derived from a cultivation of this root, an acre producing a ton, saleable at more than 120*l.*; but this would depend upon circumstances and the success of the cultivation.

Your's truly,

K. K.

Manchester, February, 1810.

"Respecting the subject of cultivating Madder in this country, we beg leave to inform our Correspondent, that it has already been attempted, but of the particulars attending it, or probable result, we are not yet so fully acquainted as to be sanguine in expectation of the result thereof: in page 248, No. 15, Vol. 3. will be seen a no-

tice of the cultivation of Smyrna Madder in this country, by Mr. Spencer Smith; and also that the seeds had propagated the plant with *experimental success*, in the Botanical Garden at Sloane-street. —*Editor of Com. Mag.*"

For further information as to the method of cultivating madder, I refer to Arthur Young's account of Mr. Arbuthnot's madder plantation, and (not the article madder alone but) to the articles *madder*, in Rees's Encyclopædia, particularly the last article entitled Madder, Rubia tinctorum. They are neither of them very good, but I know no better. I will send to Harmony for the practice there.

In England, the whole supply of *weld* for the finer tints of permanent yellow, is from Yorkshire. *Weld* gives a brighter colour than the inner bark of the black-oak, or Quercetron of Dr. Bancroft. Can there be any difficulty whatever in growing Weld here?

T. C.

"*Wines of Spain and Portugal.*—The wines of Spain are of two descriptions, namely, white and red, and are, for the most part, excellent. The greatest quantity of wine is made in the southern parts of the kingdom, and the sale of the article is very extensive, especially among the English and the Dutch. The wines of the Canaries, although not of actual Spanish growth, are to be met with in most of the ports of Spain, and are usually classed with the wines of that country. Although the whole of the Canaries produce excellent wines, the preference is given to those of Palma and Teneriffe. The Dutch and the English, carry on the most extensive traffic in the wines of these two islands, the latter annually taking off no less than 16,000 tons of wine; part of which they destine for the northern ports and part for England. Many other nations are engaged in an inferior degree in this traffic. When the vintage proves favourable, Teneriffe annually makes up about 30,000 pipes of Vidonia, or, as it is sometimes denominated, *Bastard Madeira*, from the similarity of its flavour and appearance to the dry wine of the last mentioned island. Teneriffe also produces a sweet wine, which comes very near Malmsey Madeira: this is sold in the island at about 14*l.* though sometimes as high as 20*l.* per pipe, and the Vidonia at 10*l.* and upwards. The duty paid at the port of London on Teneriffe wines is 107*l.* 11*s.* per ton, and the market price of Vidonia at present (duty included) is from 70*l.* to 85*l.* per pipe, (1808).

"The wine of Chacoli, in Biscay, is not of a first rate quality. In order to produce this wine the Biscayans ingraft five or six

different vines upon the same stalk. Most parts of Biscay abound in these vines, which border the high roads, generally growing to the height of about three or four feet. The wine in Biscay is sold at a certain price, as regulated by the police, and until the whole produce of the vintage is disposed of, no foreign wine is permitted to be brought into the province; hence it happens that the sole study of the proprietors of vineyards is to collect a large quantity of wine, without attending to quality or flavour, and consequently Chacoli has become proverbially despicable in Spain. Indeed the grapes are not allowed to arrive at a state of maturity, but are gathered and squeezed, while sour and nearly devoid of substance; now if the juice were allowed to collect and meliorate in the grape, if the green fruit were not mingled with the ripe, if the wines were made with the same care as are those of other provinces, this *despicable* Chacoli would undergo a proper fermentation, gain strength, acquire a delicious flavour in lieu of its present acid and nauseous taste, and would moreover prove equal in every respect (except that of seniority) to the French Champaign, which, of its kind, stands at present unrivalled.

"The wine of Guidas, in Castile, is made from cherries, and is a species of Ratifia. Foucal wine, which takes its name from a village situate near Madrid, is of a good quality, but it is only reckoned an ordinary wine.

"The wines of Val de Penas, Ciudad Real, Ribadavia, and Rioxa, and those called La Mancha are very good, and except in regard to different degrees of colour, are nearly similar in every respect.

"The best wines of Arragon are those denominated Garnachas, so called from the species of grape which produces them: the best of all is a red wine named Hospital; it is excellent as to flavour, strength, &c. and is besides a capital stomachic. Caninea, called likewise white Garnachas, is very fine, and is much esteemed.

"The wines of Peralta, Tudela, Tafalla, and Arandillo in Navarre, are nearly alike, and are excellent both as to flavour and quality. That of Peralta is well known under the title of Rancio, which it receives when old enough to merit that distinction. To these may be added the wine of Iluesca, which is very good.

"The wines of Xeres, better known under the name of Sherry, are made at the aforesaid town, which is situated in the province of Andalusia. They are not only dry but sweet; the dry, however, are the most esteemed, more particularly when their face

presents a pale straw colour. Many who are in the habit of tasting Sherry, have doubtless perceived that there is something in its flavour which partakes of the taste of leather; this is owing to the custom of bringing the wines down the country in large leathern vessels, or, as the Spaniards call them, *boots*, whence we derive our term butts, which we bestow upon the casks wherein we receive the wines. These wines are shipped at most of the Spanish ports, but particularly at Cadiz, for all parts of Europe, but indubitably the greatest quantity is sent to England. The present prices of Sherry are from 80*l.* to 100 guineas per butt.

"In Andalusia are also made sweet and dry wines called Pagarete* and San Lucar, and the strong well known red wine, denominated Tinto Rota or Tent, which is an excellent stomachic, and is generally recommended by skilful *accoucheurs*, as being of infinite service to women in child-bed. The Montilla is a dry wine. The territory of Xeres alone annually produces above 60,000 pipes of wine.

"In the province of Grenada, is made the celebrated wine called Mountain or Malaga, which is commonly shipped from the port of Malaga. Vast quantities are exported for England and Ireland. It is dry and sweet, and is both red and white. It is a truly delicious wine, and is much esteemed in Great Britain; its prices in the English market, at present, vary from 60*l.* to 80*l.* The sweet Mountain is the most sought after, and is usually employed as a desert wine. Grenada produces Peroximenes or Pedro Ximenes,† which is oftener imported into Ireland than England; it is a very fine flavoured full bodied wine. There is also a kind of Malmsey made in this province, which is exquisite; but that of Maravella is only an ordinary wine.

"In Valentia is found Tinto Alicante, a wine much used in France; it is sweet when new, but grows thick and ropy as it becomes aged: it is a good stomachic.

"The Benicarlo wine is red, dry, and thick; it is often palmed upon the public by wine dealers as Port wine, to which it is very inferior both in quality and price. An imposition of this sort is to be avoided by observing whether the wine offered have a ruby colour instead of a deep black, a generous flavour, and not that harshness which immediately offends a good palate; if not, it assuredly cannot be Port wine. The wine called Siches and that called Garnache, both made in Catalonia, are exquisite. In the same province are made Tinto de las Montanas or Mountain Tent, and

* Pachioretti. † Padre Ximenes.

Mataro wine, both of which are sweet, thick, ropy, and unwholesome. The latter is often sold by irreputable traders to private families as Tent, but in this respect an experienced wine broker cannot be deceived.

"It is almost needless to observe that the wine called Port, of which such vast quantities are consumed in Great Britain, is the produce of Portugal. The vines, whence it is made, grow upon the banks of the Douro, about 14 or 15 leagues from Oporto, and occupy a space about six leagues in length, and two leagues in breadth. These vineyards produce between 60 and 70,000 pipes of Port, and there are others which yield nearly 6,000 pipes annually. The vine whence we derive our Port, originally grew in Burgundy, but the climate of Portugal, being widely different from that of Burgundy, has caused such an alteration in the grape, that no two wines are more unlike than those which are the produce of each of the above mentioned territories. The wines Di Ranio* are prohibited from being exported to any part of the world except Brazil, but the English factory established at Oporto have sometimes contrived to ship a few pipes to this country.

"In the province of Algarva a small quantity of indifferent wine is made, but it constitutes no branch of export trade; indeed Port is the only wine which the Portuguese derive profit from, and it may be truly said to be the grand prop of their commerce. The wines of Portugal, like those of Biscay, are only sold at the prices annually regulated by the government. As soon as the prices are promulgated, the factory and individuals send in their names to the proprietors of the wines; the whole of the Port wine is shipped at Oporto.

"The brandy of Spain constitutes an article of considerable commerce; it is very inferior to the brandy of France, and is principally used in making up Spanish and Portuguese wines. The brandy of Portugal is nearly the same as that of Spain, very little of it is exported.

"Raisins or dried grapes are produced in abundance in all the provinces of Spain. The Valentia and Grenada raisins are certainly the most esteemed of any, the produce of Spain. The mode of drying grapes at Valentia is as follows: The grapes are first dried in a ley made of vine stalks, the juice issues from the pores of the fruit, and when placed in the open air is crystallised; the raisins

* A light Port.

are finally exposed to the sun, after which nothing can improve them more than a voyage.

"Immense quantities of most excellent barilla, pot-ash, and pearl-ash, chiefly the produce of Alicant, Valentia, Murcia, and part of Grenada, are annually exported from Spain; there is no country in the world whence these articles are to be met with in greater perfection than in this.

"The oranges and lemons of Spain are of a very excellent kind, and large quantities are annually exported from the different ports of that country for England and Ireland; from September till January is the properest time for shipping these fruits; it is dangerous to speculate in the articles at other seasons.

"Spain likewise produces some oil, which is seldom exported, and is often used as a substitute for butter; hemp, which is grown in Grenada, Murcia, and Valentia; senna, which has been preferred to that of the Levant; tobacco of the finest quality; and wool, whose excellent quality is too well known to need any comment.

"The fruits of Portugal, which are esteemed by foreigners, consist of figs, grown in the kingdom of Algarva exclusively, and which are said to be superior to those of Spain and Barbary; almonds far inferior to those of Spain (which are indeed excellent, especially such as are shipped from Valentia); oranges and lemons, more noted for their quantity than their quality; and some wools."

Alexander & Phillips, Printers, Carlisle.

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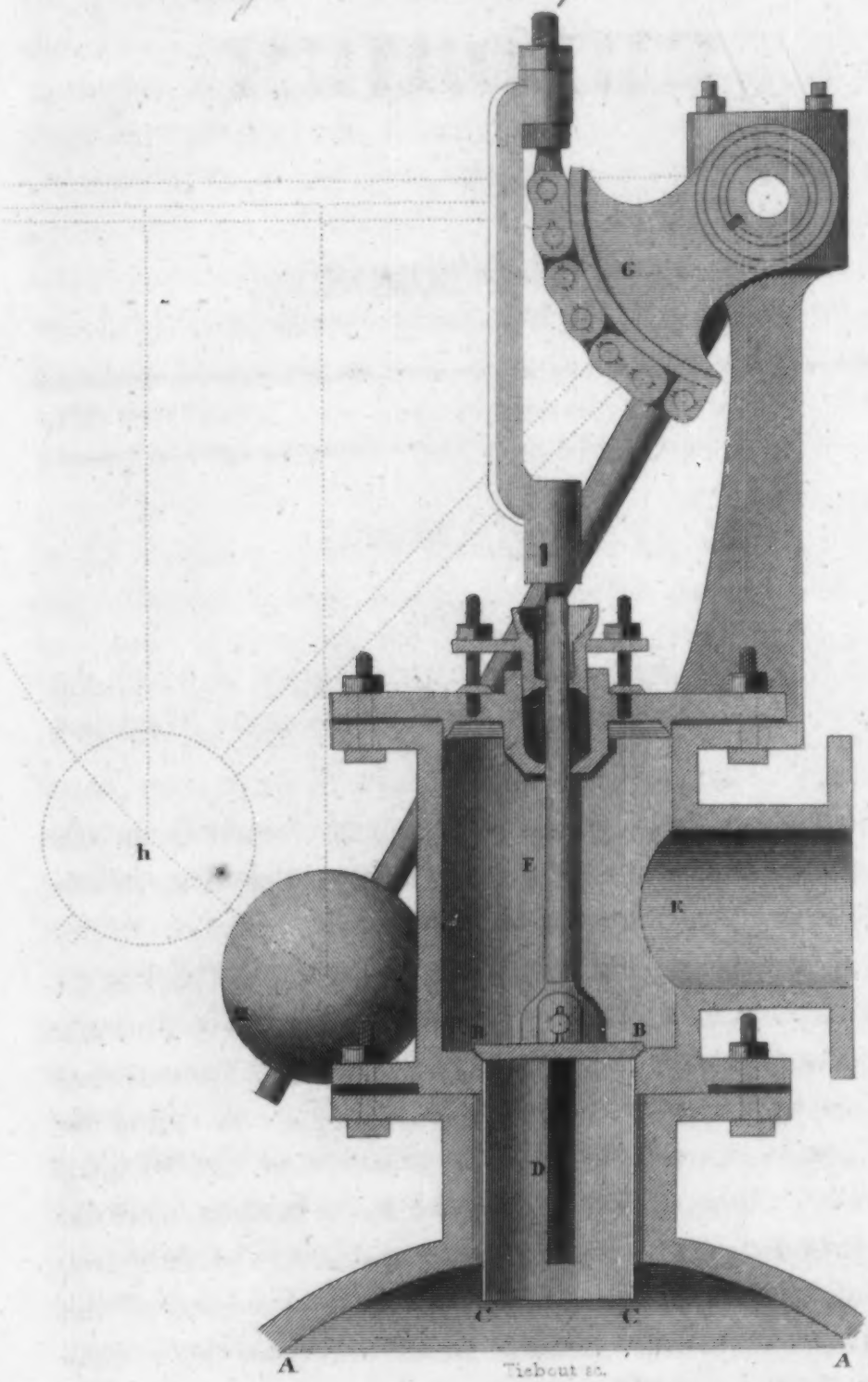
ERRATUM.

In page 300 under Poor, for *daennially* read *decennially*.

Self acting & regulating Steam Valve
by Mr. Arthur Wolf.



Tiebout sc.

3 6 12 18 24

Scale of Inches